MC4 Hot-Mix Base Tried on Kansas "I" Job page 80

November, 1961

# ROADS AND STREETS

A GILLETTE PUBLICATION

UNIVERSITY MICROFILMS
EUGENE B. POWER
313 N. 1ST ST.
ANN ARBOR, MICH.
COMP-LBY-11-50

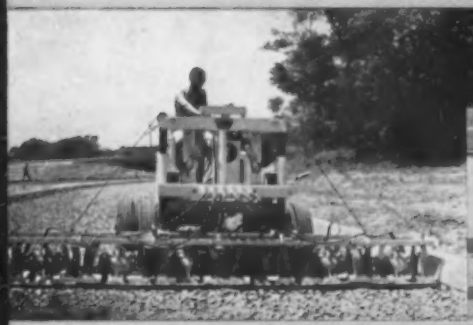
# PERFECT COMPACTION . . . EVERY TIME

## Rapidly and at lowest cost!

Note the compacted area in the photo above. It's exceptionally smooth, compacted to specified density from its firm surface to the required depth. And the JACKSON had no difficulty, whatever, in staying ahead of the spreader. On any job of granular soil compacting from sand to rock as used in base courses or fills the JACKSON offers the best means of achieving specified densities at lowest cost. Each of the compactor units provides 4200 3-TON BLOWS PER MINUTE. The JACKSON functions equally well in either direction . . . no turning or deadheading required. And when occasion dictates, each of the compactor units can be fitted with an operating handle and used as a self-propelling compactor to compact the tight places other equipment cannot reach. It's the most versatile machine of its kind on the market. Both operating and maintenance costs are extremely low. And the JACKSON service organization goes sled-length in seeing to it that you get maximum benefit from the machine.

## RENT the JACKSON MULTIPLE COMPACTOR

**from your local distributor. It's the no-risk way of discovering the fastest, most effective and economical method of compacting all granular soils and soil-cement mixes.**



**Working width is 13', 3". The two outer units on either side may be raised and made inoperative to suit narrower coverage requirements.**

**Changing to the 88" width, overall, for road travel or maneuverability around other equipment is accomplished hydraulically in 30 seconds.**

**The new widening attachment (optional at added cost) is raised or lowered instantly . . . . ideal for widening projects.**

# JACKSON VIBRATORS, INC.

LUDINGTON . . . for more details circle 303 on enclosed return postal card MICHIGAN

## *So durable it outlives the project . . .*

# Galvanized Beth-Cu-Loy Drainage Pipe

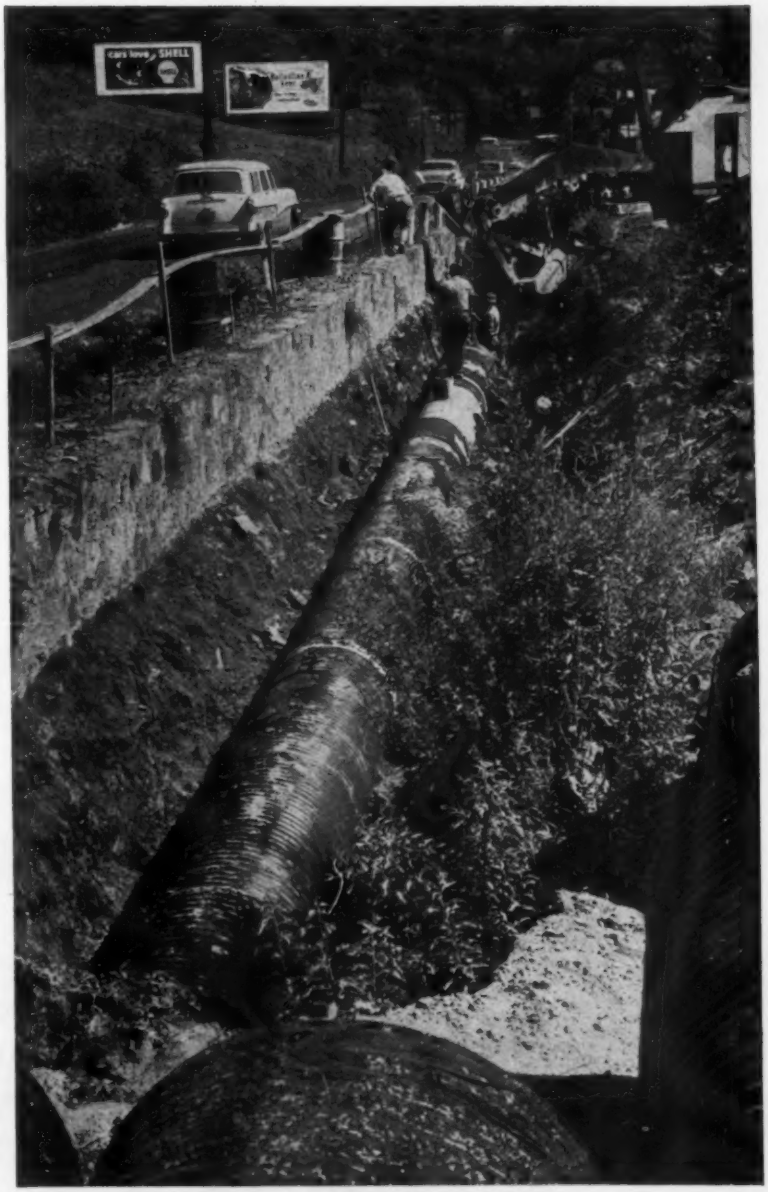
For over 50 years thousands of corrugated metal pipe installations have been studied. These studies show clearly that drainage structures made of galvanized corrugated Beth-Cu-Loy steel sheets are as durable as you could want. That's one reason why you can figure that Beth-Cu-Loy pipe will probably outlive the original drainage need.

A Beth-Cu-Loy drainage structure gets its durability from two sources. First, the strong copper-bearing steel sheet itself; second, the tightly-adherent corrosion-resisting zinc coating (2 oz per sq ft by triple spot test). These two ingredients combine to give you a pipe that is strong, long-lasting, light in weight, flexible.

And flexibility is important, too. It is the flexibility of a Beth-Cu-Loy pipe that transfers some of the imposed load to the surrounding material. Many states actually specify the use of corrugated steel pipe under fills of less than 2 ft or more than 15 ft. The product lends itself to the pipe-arch design where low headroom is a factor.

A Beth-Cu-Loy pipe is easy to handle and install; requires a minimum of engineering. Field joints can be made in minutes without delays for setting or curing. The Beth-Cu-Loy sheets conform in all respects to the specs of the AASHO. Ask your fabricator for full details about drainage structures made from corrugated galvanized Beth-Cu-Loy.

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.
*Export Sales: Bethlehem Steel Export Corporation*




**Tar-enameled Beth-Cu-Loy corrugated steel pipe being installed as storm sewer along eastern Pennsylvania road. The pipe should easily outlast this drainage need.**

Galvanized Steel

*for strength*
*. . . economy*
*. . . versatility*

**BETHLEHEM STEEL**

BETHLEHEM STEEL

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# ROADS AND STREETS NOVEMBER, 1961

HIGHWAYS • BRIDGES • AIR FIELDS • HEAVY CONSTRUCTION



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## FRONT COVER SCENE

A John Deere 840 diesel tractor with Hancock scraper is seen on the project of Guy F. Atkinson, Inc., in the Sepulveda Pass section of the San Diego Freeway, near Los Angeles. This and other medium and small tractor units effectively supplemented the company's heavier machines.


Controlled Circulation postage paid at Milwaukee, Wisconsin. Published monthly. Subscription $6.00 per year ($7.00 foreign.) Form 3579 requested to be returned to Gillette Group, Magazine Publishing Division, the Reuben H. Donnelley Corporation, 22 W. Maple St., Chicago.


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# NOW! Goodyear off-the-road tires give you the protection of steel to minimize cuts and cut growth!

Here's important news! The Super Road Lug and other Goodyear construction equipment tires now give you *shredded wire undertreads!* That means, with the Super Road Lug, for instance, you get:

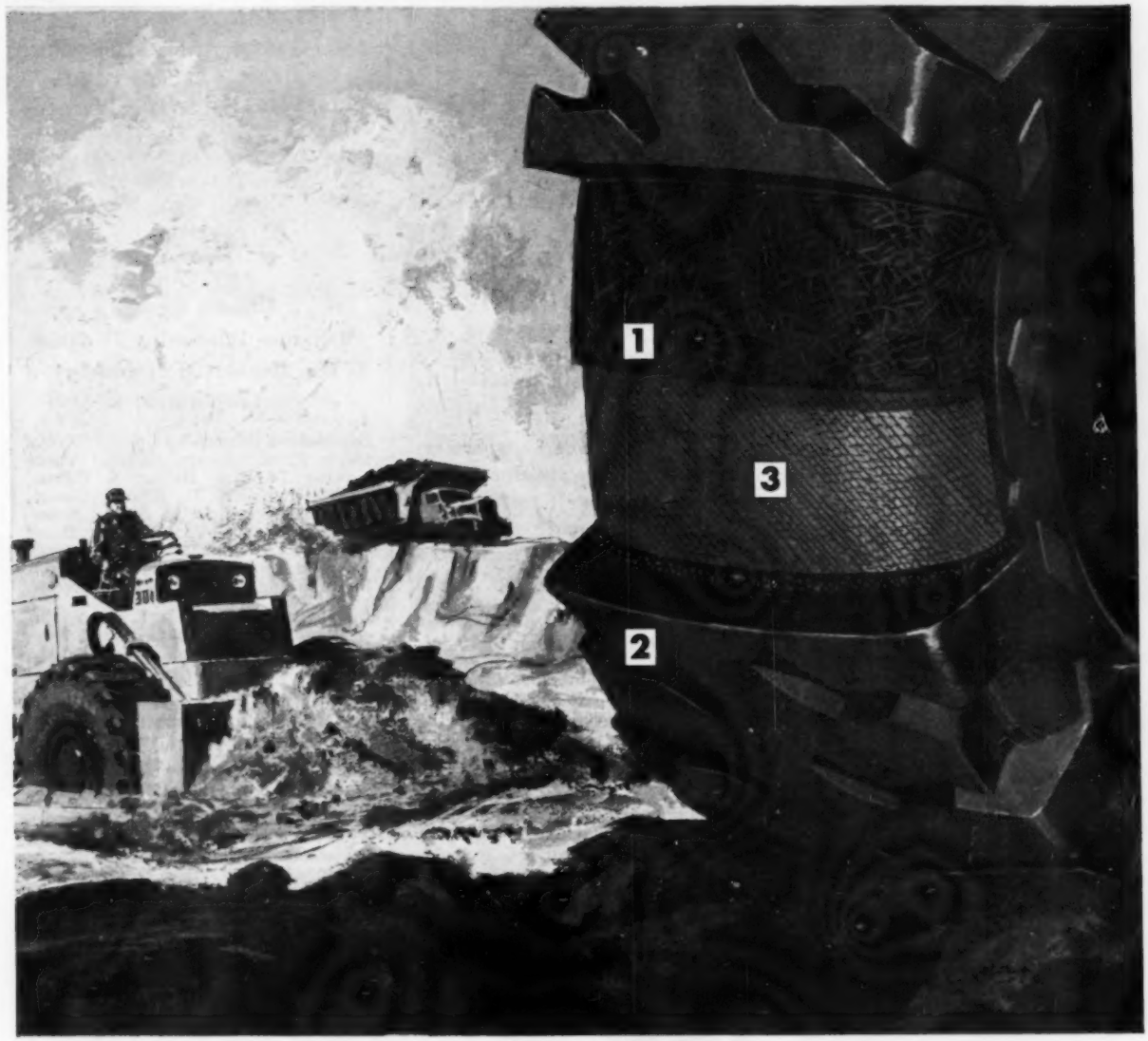
**1** **A rugged shredded wire barrier** that fights body-penetrating cuts, reduces separation, retards cut growth and serves as a cushioning bridge between the carcass and the tread. This gives you a tougher, longer-lasting construction that pays off in more service!

**2** **An extra-thick tread** with up to 50% more nonskid tread than ordinary tires! This gives you more miles for your dollar, more heft and traction on tough jobs!

**3** **Exclusive 3-T processed Nylon Cord,** triple-tempered by Tension, Temperature and Time to make bruise-breaks and blowouts all but a thing of the past!

All these dramatic features add up to increased tire life and more miles for your tire dollar. Prove them for yourself. See your Goodyear dealer—today!

Goodyear, Truck Tire Dept., Akron 16, Ohio




Buy and Specify GOODYEAR

Road Lug—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

More tons are hauled on Goodyear Truck Tires than on any other kind

. . . for more details circle 296 on enclosed return postal card

# Before You Buy Demand Facts on Spreader Performance

*. . . Nothing on the market today can match the performance of the Flaherty Spread-Master!*

Investigate. Ask for a factual account of performance when you look for a spreader. As a cost-conscious buyer, you can't afford any machine that can't prove its worth.

With the Flaherty Spread-Master, spreading is a continuous operation. Gravel and baffle plates assure uniform application of material, eliminate the need for drag brooms, patch trucks, or hand labor. Front and rear wheel widths are staggered to avoid wheel tracks. A much tighter and smoother surface is obtained. Large aggregates go in the oil first; fines on top. And on job after job, Spread-Master has proved savings of 20% in materials over other methods.

- Easily adjusted radial cut-off gates permit spreads from 6 inches to 13 feet.
- 13-Ft. spread hopper has ample material storage for continuous spreading.
- A 6" spread roll and full-width rod screen assure uniform flow of material.
- Receiving hopper has big capacity; 2 independently operated 20" conveyors carry material to front hopper.
- Spring-loaded truck hitch permits hooking and unhooking of aggregate trucks without stopping. Pulls trucks out of gear — cuts maintenance.
- 5 forward and reverse speeds with mid-ship shuttle gear transmission; ample power to handle tandem-axle units.

**Flaherty Manufacturing, Inc. Branch**
**BUFFALO-SPRINGFIELD CO.**
**Pocatello, Idaho** A Division of KOEHRING Company

F100

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## ROADS AND STREETS

Devoted to the design, construction, maintenance and operation of highways, streets, bridges, bridge foundations and grade separations; the construction and maintenance of airports. Represents 69 years of continuous publishing in the highway field; combined with Engineering and Contracting and Good Roads Magazines, established in 1892.

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*Editorial and Advertising Offices:* 22 West Maple Street, Chicago 10, Ill. (Phone Superior 7-1581.) Halbert S. Gillette, Publisher; Robert T. Wilson, General Sales Manager; Fred H. Bowes, Representative; E. Bender, Clearing House Manager; J. L. Latta, Advertising Production Manager; A. W. Lehmann, Market Research and Sales Promotion Director.

*Circulation Office:* Frank L. Mack, Circulation Director, 466 Lexington Ave., New York 17, New York. (Phone Oregon 9-4000)

*New York Office:* 15 East 40th St., New York 16, N. Y. (Oregon 9-7750-7751.) Fred Michel, Eastern Manager.

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# Twin-engine rigs can't beat Payscraper® yardage!

"Hauling to a fill up a 5% grade, the International 295 Payscraper travels and dumps as fast as our twin-engine scrapers—matches their yardage, too!"

R. H. Godwin, Sup't
C. C. Mangum, Inc.
Raleigh, N. C.

"Production of our 495 Payscraper is equal to the twin-engine units running in the same cycle. The 495 is an ideal long-haul rig!"

W. W. Gibson, V. P.
Gibson Construction Co.
Donalsonville, Ga.

**Two separate earthmoving jobs,** involving big yardage and long hauls, recently compared dirt-on-fill production of big-capacity scrapers. Results were startling. On one job, a 2-axle International 295 Payscraper matched a comparable-size twin-engine rig yard for yard. On the other job, production figures told the contractor he equalled twin-engine scraper production with his less expensive 3-axle International 495 Payscraper—and at a much lower operating cost!

**Power is put to better use** in the Payscraper to give you a quick-loading, fast-hauling, clean-dumping rig. In the cut, large planet gears in the final drive handle full torque loads imposed by the turbocharged 375-hp diesel engine, while the 7-speed power shift transmission adjusts torque and load to speed, gets you out fast. On the haul road, positive power control of all operations, with speeds to 33 mph, permits full performance with heaped loads. Exclusive rack-and-pinion design and forward spindle pitch turns the 295 Payscraper safely, with automotive ease. At the dumping site, the big 94-in. apron opening and two ejector plate push members assure positive ejection of the whole 34-yd. load. Positive, pto-driven cable control unit is finger tip controlled.

**Compare loading, roading and dumping cycles** with any other rig, and you'll see how Payscraper efficiency increases earthmoving profits. Call your International Construction Equipment Distributor today and let him show you what the 2-axle 295 or the 3-axle 495 can do on your job!

*International® Construction Equipment*

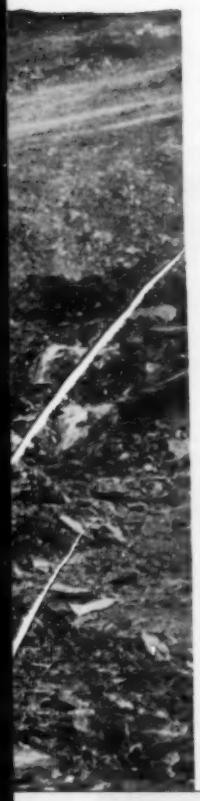
International Harvester Co.,
180 North Michigan Ave., Chicago 1, Illinois
A COMPLETE POWER PACKAGE

. . . for more details circle 302 on enclosed return postal card

# "EUC" TC-12 . .

**Your Euclid dealer will be glad to show you what a TC-12 can do in stepping up production and protecting profits on ripping work.**

# . . . Best Ripper, Bar None!



## Before you drill or shoot . . . be real sure that a TC-12 can't do the job

With up to 35% more net h.p. and far more work capacity than other "big" crawlers, the Euclid TC-12 has almost unbelievable ripping ability. On job after job, full-power shift TC-12's are ripping rock that the biggest competitive tractors can't handle.

This unmatched ability to rip tough materials has greatly extended the use of scrapers and cut earthmoving costs on a wide range of work. On jobs that would ordinarily call for drilling, shooting and shovel loading, a TC-12 with ripper often permits the use of scrapers and provides a big saving in yardage costs. Equipped with dozer and ripper, the "Euc" is a versatile tractor capable of doing more work on any job . . . and doing it faster at lowest possible cost.

- **More weight and net h.p.**
  (100,000 lbs. — 425 total net h.p.)
- **Better Balance and Tractive Ability**
- **Rugged Design of Rippers**
- **Complete line of ripping attachments**

## A new answer to "is it rippable?"

Prior to the availability of the big Euclid TC-12, material that couldn't be ripped by other tractors had to be drilled and blasted for shovel loading or dozing. Now with the power and traction of the Twin Crawler, you can rip rock and other material that simply isn't rippable with even the biggest competitive tractor. Here are a few of the jobs where a TC-12 can cut costs to new lows for tough materials:

*Airport Construction...Highway Cuts*
*Mines and Quarries...Missile Bases*
*Dam Construction...Industrial Grading*
*Pipeline Work...Logging Haul Roads*

GM GENERAL MOTORS EUCLID

**EUCLID**

DIVISION OF GENERAL MOTORS, HUDSON, OHIO
*Plants at Cleveland and Hudson, Ohio and Lanarkshire, Scotland*

*How the*

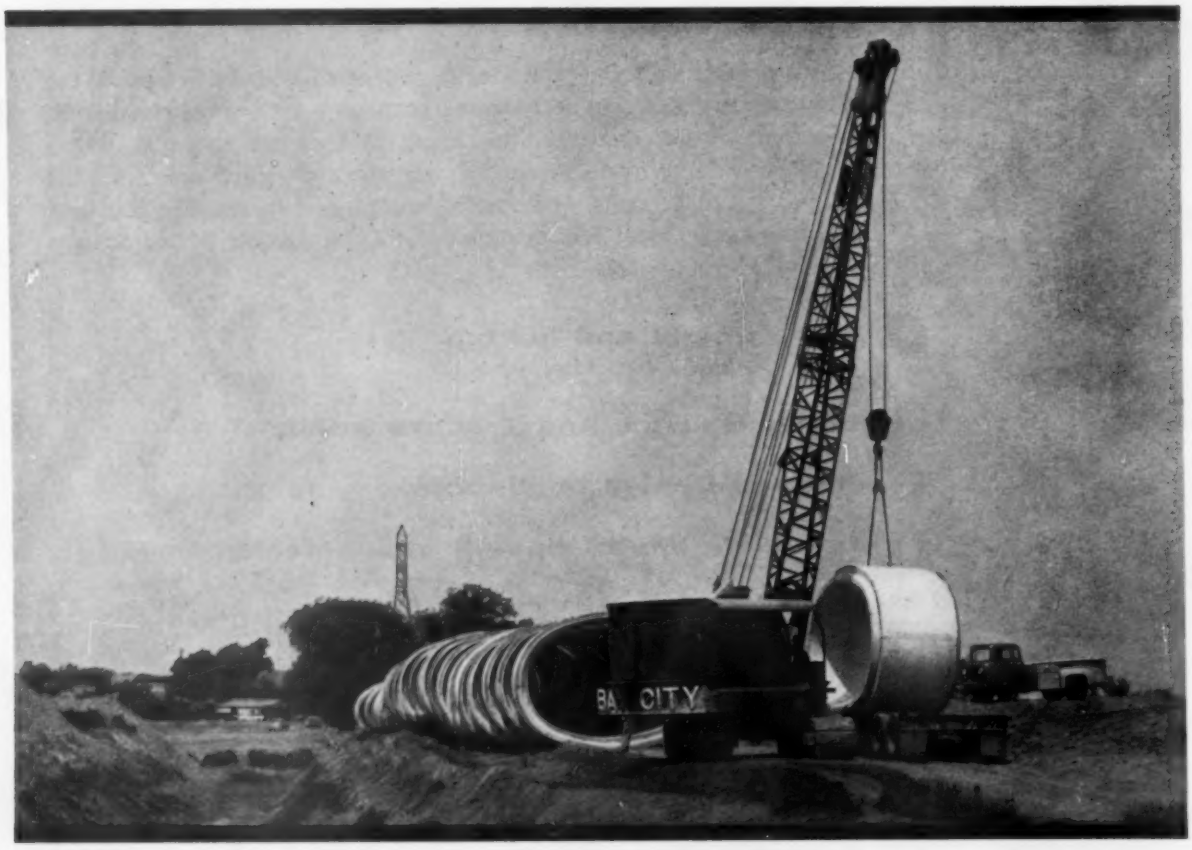
# BAY CITY 72

*Will Help You Close the "PROFIT GAP"*

What's the true measure of a profit-producing crane-excavator? On-the-job ability and on-the-job dependability. You get both, in the highest degree, in a BAY CITY Model 72. This 1½-yd. excavator with 30-ton Crane capacity offers you a combination of proved advantages that can well make the difference between break-even and profit.

• **SMOOTH, BALANCED POWER** is provided through a fluid coupling and an enclosed speed reducing unit consisting of helical gears splined to shafts mounted on ball bearings. Running constantly in a bath of lubricant, this assembly gives longer life . . . eliminates adjustments required with a chain drive.

• **POWER CONTROLLED BOOSTERS** set main clutches with minimum hand lever pull. While easy to adjust, these clutches actually require less maintenance attention — there are no delicate mechanisms such as compressors, pumps, valves or tubing lines to cause trouble and slow down operations.




**Here's a Model 72 in action during relocation of U. S. Hwy. 12 near Benton Harbor, Mich. The machine is working on a large drain section over which an overpass is to be built. Each 13-ft. dia. drain pipe weighs 22 tons.**

• **CAST STEEL BASES** for lower works and revolving frame resist deflection . . . withstand shock loading . . . assure longer service with minimum maintenance. Roller and ball bearing mounting of all drums and shafts assures maximum transmission of power.

• **ALSO AVAILABLE AS ERECTION CRANE** with a fully independent boom hoist, power operated for both raising and lowering, an automatically set boom brake, a power load lowering device, a collapsible hi-gantry, pendant cable suspension, telescopic boom stops and pin-connected boom sections. This combination of features results in faster, safer load lifting and spotting . . . quicker, easier setups.

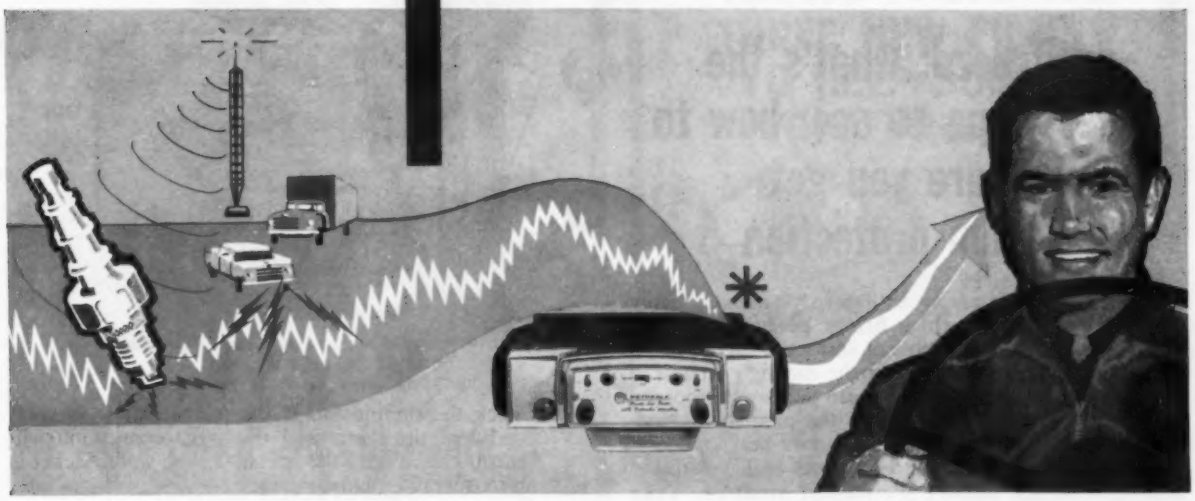
If you are planning on new equipment, there are many other Model 72 advantages you should know about. Have your BAY CITY dealer tell you what they are. Remember — there is a difference between promising bigger profit margins and actually delivering them!

**BAY CITY SHOVELS, INC.**
**2611-C Center Ave.**
**BAY CITY, MICHIGAN**

*a subsidiary of Unit Crane & Shovel Corp.*

. . . for more details circle 279 on enclosed return postal card

# new...Motorola MOTRAC radio with EXTENDER operation



## ✳ CUTS OUT IGNITION NOISES

**Dramatically Improves Overall Efficiency In 24-50 mc 2-Way Radio Systems**

Motorola MOTRAC radio with Extender operation puts ignition noise suppression where it does the most good—built right into the receiver. Here it suppresses ignition noises from your own vehicle as well as those in the vicinity...providing the answer to the biggest problem in low-band 2-way radio systems today.

*First and foremost,* Extender operation improves reception throughout your system. In as much as ⅕'s of your territory, ignition noises can garble your messages. Now messages are clear. "Hash" caused by ignition noise is gone. *Second,* you can "extend" useable operating range where ignition noises are high. Motorola Extender operation suppresses disrupting ignition noise on weak, fringe area signals allowing the message to come through clearly—right out to the limits of your radio coverage. *Third,* you can reduce interference from other radio systems (extraneous messages, ringing and other noise interference known as intermodulation)... just flip the switch on the control head.

*"MOTRAC" is a trademark of Motorola Inc.*

**HEAR FOR YOURSELF**

Send in coupon NOW
for a free, on-the-job recording...
listen to the dramatic
difference in message clarity.

**Motorola Communications & Electronics, Inc.**
4501 Augusta Blvd., Chicago 51, Illinois
A Subsidiary of Motorola, Inc. Dept. ARS145

☐ Send me phonograph record

☐ Have salesman phone for appointment

Name _____ Title _____

Company _____

Address _____

City _____ Zone _____ State _____

**MOTOROLA 2-WAY RADIO**

. . . for more details circle 311 on enclosed return postal card

# LUBE LOGIC

# Tips for more

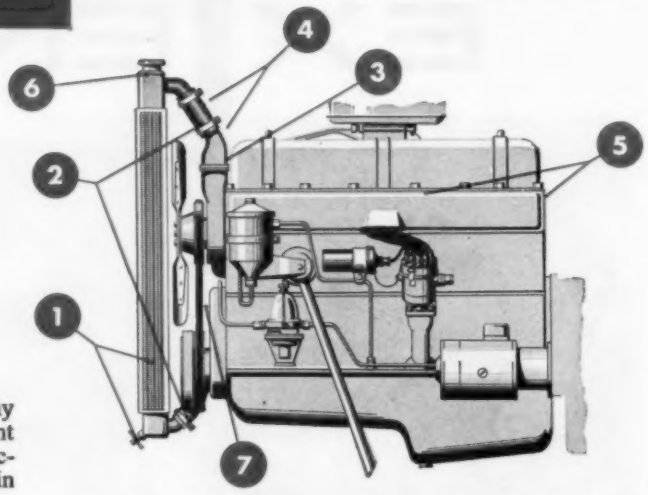
## Antifreeze: what's the best type to use; how to make sure you get maximum protection

It's getting pretty close to antifreeze weather in many parts of the country, which brings up two important points: choosing the best type of antifreeze for construction machinery; and making sure the cooling system is in good condition, so the antifreeze can do its job properly.

The right type of antifreeze is the permanent kind. Construction equipment engines operate best at 180°F jacket temperature which is ten degrees higher than the boil-off point for alcohol. Permanent antifreeze (like Texaco Startex) will stay on the job at the temperature that's best for the engine. *Don't* substitute salt or kerosine solutions. They won't freeze, true enough, but they're tough on engine components.

It's important to keep the cooling system in good shape for three reasons: first, because antifreeze that gets into the crankcase causes severe varnish deposits on pistons and rings; second, because you want the antifreeze solution to circulate properly; and third, because antifreeze lost through a leak costs a lot more to replace than just plain water. Before you add antifreeze, check the following points:

1 Clean the cooling system—drain and flush thoroughly.
2 Check the radiator hoses, replace any that are soggy or collapsed.




3 Check the thermostat. If the thermostat is in good condition, the thermostat discharge connection will remain closed until the coolant in the water jacket is up to operating temperature.
4 Tighten connections on hoses that don't need replacing. Antifreeze can pass through spaces too small for water leaks.
5 Tighten cylinder head, oil cooler and other hold-down bolts.
6 Check radiator filler cap gasket.
7 Inspect and adjust fan belt.
8 Now you're ready to put in the antifreeze.

**After the antifreeze is in, it's a good idea to:**

1 Check the level at operating temperature.
2 Check for leaks.
3 Check water pump packing nut adjustment.
4 Check cooling solution with suitable hydrometer to make sure of protection temperature.

## Metal concrete forms can be readied for re-use faster

You can get metal concrete forms cleaned up and back on the job faster if you spray them, before use, with Texaco Stazon. Use the Stazon just as it comes from the container for best results. Field reports say it gives the concrete a fine smooth finish, and the Stazon prevents sticking, shortens clean-up manhours.

## Magneto Lubrication: three IFs and a BUT

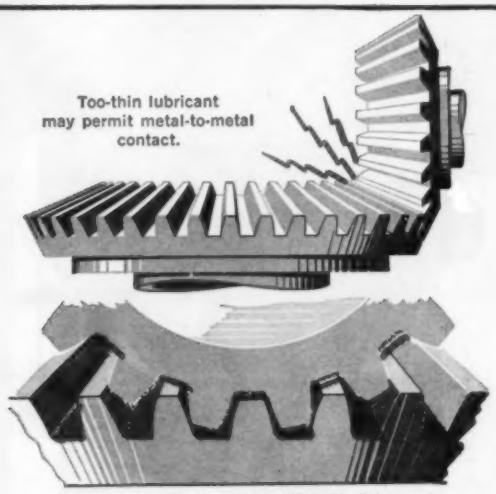
IF the magneto is oil-lubricated, apply a few drops of oil every 500 hours.

IF the magneto is grease lubricated, apply Texaco Marfak Multi Purpose 2 every 100 hours.

IF the magneto is located near the engine exhaust pipe, lubricate with Texaco High Temp Grease every 50 hours.

BUT if the bearings on your magneto are *sealed*, follow manufacturer's recommendations and let the distributor do the servicing.

# efficient equipment performance




Too-thick lubricant will hold dirt,
pack in gear teeth, may damage bearings.

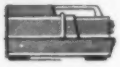
## Key points in choosing gear lubricant for gyratory crushers

One of the toughest lube jobs on a gear-driven gyratory crusher is the gears themselves. They're partly protected by oil-tight cases and dust rings, but some contamination is inevitable, and it's essential that you choose a lubricant that can take it.

Viscosity is very important. These gears are very heavily loaded, so too-low viscosity may not provide a film thick enough to prevent metal to metal contact. On the other hand, if the lubricant is too thick, it will hold grit and dust in suspension, and let it develop a scoring action on the gear teeth. In addition, dust tends to dry out lubricants, and also creates a "packing" condition between gear teeth. This packing of dust and dried lubricant can build up undue pressure on gears and bearings.

Your best bet is a lubricant with a viscosity between 50 and 160 seconds Saybolt Universal at 210°F, with extreme pressure characteristics. These specifications will get you a lubricant with a good compromise between too thick and too thin. Ask any Texaco Lubrication Engineer to help you pick the right grade for your temperature zone.

**1. PLAN FOR PROFIT**—Texaco's newest color-and-sound movie. Dramatizes the major savings you can make with the proper investment of less than 1% of your total budget—the amount you spend on lubricants. Film features latest lubrication methods and equipment on a number of contracting projects, demonstrating the Texaco Simplified Lubrication Plan in action.



**2. FUNDAMENTALS OF LUBRICATION**—a brand new Texaco color slide film. A clear, concise once-over that defines technical terms like "viscosity" and explains specifically what lubrication is and what it does. This down-to-earth discussion will give the lubrication man a new understanding of the importance of lubrication, and a fresh interest in his work. It's supplemented with a manual that covers the same ground in greater detail.

**3. LUBRICATION OF EARTHMOVING EQUIPMENT**—a new slide film, in color. A concise, easy-to-understand analysis of proper lubrication of engines, wheel bearings, steering, track rollers, crawler treads, hydraulic equipment, wire rope, open and enclosed gears. Supplemented with a manual that covers the whole field of earthmoving equipment lubrication in greater detail.

**FOR AN EARLY SHOWING** of any one of these films—or all of them—contact your Texaco Contractor Representative *now*.

## TEXACO LUBRICATION ENGINEERS

Every month or so we'll bring you a batch of "sleepers," little angles, so easy to overlook, where big savings in time and money can be made. If Lube Logic doesn't solve your problems, call your local Texaco man. Anytime, all the time, he's your best source of money-saving lubrication ideas. Don't forget that "Lubrication is a major factor in cost control." Texaco Inc., 135 East 42nd Street, New York 17, N. Y.

Tune In: Huntley-Brinkley Report, Monday Through Friday—NBC-TV

TEXACO

*Throughout the United States*

*Canada • Latin America • West Africa*

# NEWEST STANDARD ASPHALT PLANT EQUIPMENT ON WHEELS

## STANDARD MODEL S-E "SELF-ERECTING" ASPHALT PLANT...ON WHEELS!

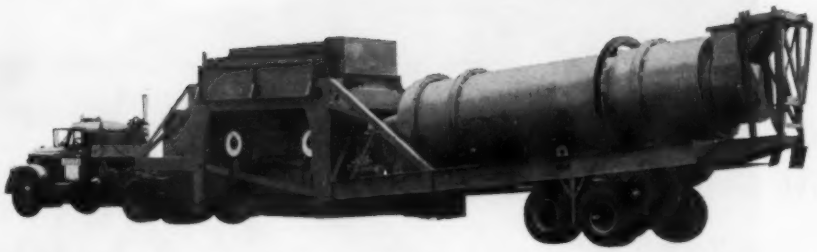
This revolutionary new STANDARD plant is completely portable throughout; each unit being completely self-contained on its own rugged trailer frame. Through the use of exclusive patented "Self-Lift" hoisting device, entire plant may be erected in a matter of hours without need for expensive crane. Plant is manufactured in batch capacities of 4000, 5000 and 6000 pound and is available with wide range of optional accessory equipment.

**STANDARD STEEL CORPORATION**

**General offices and plant:** 5003 Boyle Avenue, Los Angeles 58, Calif.
**Midwest offices and plant:** Decatur 3, Ill.; **Eastern offices and plant:** Lowell 3, Mass.

Manufacturers of: Asphalt Plants • Rotary Dryers • Kilns • Coolers • Cryogenics

## STANDARD MODEL TM PORTABLE PLANTS...ON WHEELS!

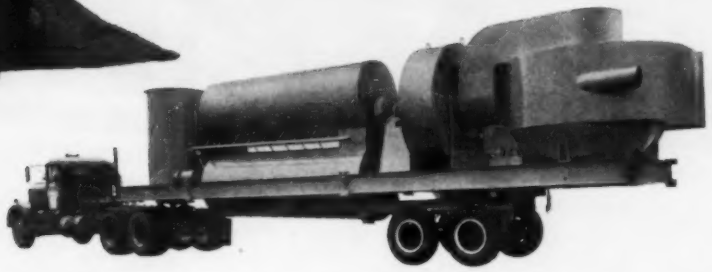


The STANDARD Model TM... the only batch type of asphalt plant built in one unit on wheels. This highly portable plant with patented push-button erection is built in four sizes, 1000 pound through 3000 pound capacity... and soon to be available, the Model TM 4000 pound Portable Plant.

## STANDARD MODEL R-M MOBILE MIXING UNIT...ON WHEELS!

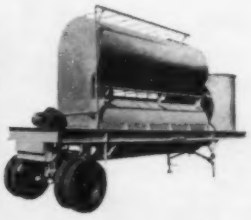
The new Model R-M mobile mixing unit recently introduced combines all of the rugged simple and dependable features of the well known STANDARD Model R-M semi-portable, crane erected mixing unit with highly portable, wheel mounted features. Especially designed for rapid transport from one job to another, and speed of erection. All units are self-contained and mounted on sturdy wheel and axle assemblies *that need not be removed* prior to erection.

## STANDARD COMBINATION DUST COLLECTOR AND WET WASHER...ON WHEELS!



Designed especially for use with STANDARD'S new Model TM Mobile Asphalt Plants. This new unit combines the ultimate in high efficiency dust control and single package portability. This combination high efficiency unit is complete with spring mounted wheels and air brakes and is arranged with self-contained jack legs to facilitate installation.

## STANDARD CENTRIFUGAL WET WASHER...ON WHEELS!



The STANDARD centrifugal wet washer unit is designed to provide maximum dust collection efficiency and to complement the portable dust collector on the Model S-E self-erecting plants. The entire unit is self-contained on a spring mounted wheel and axle assembly with jack legs and air brakes.

"The world's finest"

**STANDARD**

**ASPHALT PLANTS**

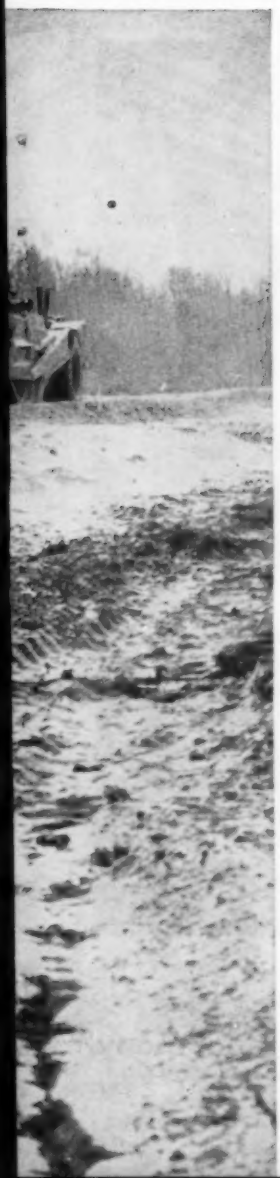
. . . for more details circle 316 on enclosed return postal card

Where highway construction is through swampy area, Michigan pushes and compacts fill base ahead of dumping scrapers. Spread is made at 8 mph, return at about 14 mph.

Working in dune sand, Holloway's Michigans "pick up" scrapers before they become stuck . . . push them through entire dump cycle and off fill onto return road at speeds up to 8 mph. Scrapers loaded weigh about 107,000 lbs, the Dozer weighs 57,700 lbs. This Michigan develops 290 hp; three other models are available—in sizes from 162 to 600 hp.

*With 4 million yards of pure sand to move on a major Interstate Highway project, this contractor decided to utilize an already available scraper spread. But units kept getting stuck in the soft footing. Then he replaced eight push-crawlers with four Michigan Dozers.*
RESULT:

# Production up 40%... dozer cost down 65%



When Holloway Construction Company, Livonia, Michigan, won a contract for 7.8 miles of Interstate Highway 94, running through sand dunes and swamps alongside Lake Michigan, they were faced with having to move 4 million yards of almost pure sand. Should they use draglines and haul units . . . or utilize an already-available fleet of 26 self-propelled scrapers? Economics dictated the scrapers.

### Fill production bogs down

"Right away we ran into trouble," reports General Supt Francis Morrell. "As soon as our scrapers would pull onto the fill, they'd bog down. Eight crawlers, assigned to spread, pull compactors and help out stuck scrapers, proved too slow to keep things moving. Also, operating in high gear was skyrocketing track costs".

"Then we replaced the eight 45,000 lb crawlers with four 57,770 lb Michigan Model 280 Tractor Dozers," Mr. Morrell continues. "Within a week, the rubber-tired units had increased production on the fill by 40% . . . and, reduced overall dozer fleet owning and operating costs by 65%".

### 7 to 8 mph dozer push clears scraper traffic jam

According to Holloway officials, the Michigans' speed was the major factor in increasing production. Before, crawlers were too slow to reach scrapers before they became stuck. Now, the Michigans are able to "pick up" loaded haul units as they enter the work area . . . and travel with them down the fill as they *dump and spread at speeds up to 8 mph*. As soon as one scraper has thus been boosted through its entire dump cycle and off the fill—a distance of about 350 ft—the Michigan quickly returns to pick up another. Meanwhile, the Dozer's big 29.5-25 tires compact the fill both ways.

### Normal dozing passes achieve 95% compaction

"One 290 hp Michigan can get a loaded 19 yd scraper dumped and off the fill in just 65 seconds . . . and it gets back to the next scraper in 45 seconds," reports Supt Morrell. "Fill damage from scraper pumping action has been eliminated . . . *and we are getting 95% compaction without the use of special equipment*".

### One Michigan's 10 hour production: 20,000 yds spread and compacted

Some of the fills on this job are 62 ft high . . . with cuts up to 92 ft deep providing 60% of needed material. Other 40% must be hauled from borrow pits up to 1½ miles away. Where scrapers are on the long hauls, Holloway officials report each Michigan Tractor Dozer is spreading and compacting between 6,000 and 7,000 pay yds (per cross-section measurement) per 10 hour day. *On short scraper hauls*, 500 ft one-way, *each Michigan spreads up to 20,000 pay yds per day.*

### "Maintenance simple, availability excellent"

"We find Michigan maintenance simple . . . and availability excellent," reports Supt Morrell. "Their speed in boosting scrapers—plus their ability to stay clear of incoming haul units—has eliminated all congestion on the fill. We feel our four Michigans have given us a new approach to fill spreading and compacting!"

Michigan is a registered trademark of
**CLARK EQUIPMENT COMPANY**
**Construction Machinery Division**

CLARK® EQUIPMENT

2497 Pipestone Road
Benton Harbor 24, Michigan
In Canada:
Canadian Clark, Ltd.
St. Thomas, Ontario

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# DEFENSE-IN-DEPTH

## ...a standard painting practice for New York State

Here's an example of Defense-in-Depth painting on the Crescent Bridge, spanning the Mohawk River, just north of Albany, N. Y. Eighteen months ago, the bridge was given three coats of paint containing Basic Lead Silico Chromate—the remarkable pigment that builds corrosion inhibition, weather resistance and durability into *every* coat. Basic Lead Silico Chromate insures anti-corrosion protection all the way out from primer to intermediate to finish, plus life-extending durability all the way in from finish to intermediate to primer. That's what "Defense-in-Depth" means. The savings are outstanding any way you look at it.

New York was one of the earliest enthusiastic users of Basic Lead Silico Chromate paint . . . backed up by National Lead's 10-year exposure tests with its own field experience on actual bridges. Result? On November 28, 1958, The New York State Department of Public Works, Division of Construction, officially issued a "Paints and Painting" standard specification calling for Basic Lead Silico Chromate pigment in *all* coats of rust-inhibitive paint systems for highway structures.

Today, paints pigmented with *M50*® Basic Lead Silico Chromate are proving their worth in states from Maine to California. Remember another big advantage too . . . *M50's* low tinting strength allows high pigmentation in a wide variety of attractive shades.

For information on how *M50* Basic Lead Silico Chromate can help you, write or call National Lead Company.

**M50**® an **oncor**® Pigment... A Development of **National Lead Company**

General Offices: 111 Broadway, New York 6, N.Y.

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**ROADS AND STREETS**

**Sixty-Nine years of Editorial Leadership**

# Washington News Letter

By Duane L. Cronk, Director, Highway Information Services

November 10, 1961

Contractors will do their own house-cleaning in answer to the recent spot scandals in highways, schools and other public works. This was top news at the Associated General Contractors of America board meeting last month in New Orleans. The AGC leaders' unprecedented action gave this 7,300-member association's ethics and trade practices committee power to investigate a guilty member or dig into suspicious situations on complaint of the AGC board, a chapter or a member contractor. This historic decision also took in plans to publicize the new stand and any action taken.

Also news at New Orleans was the AGC highway contractors' airing of grievances against the new tightened job controls imposed since the Blatnik committee's investigations began. Profit loss for many firms was claimed as a result of alleged unrealistic inspection, slow and unfair testing and delayed final payments. The new rules which caught many contractors on in-progress work are also setting the stage for new cost rises in the road program, AGC spokesmen claimed. (Next month's Roads and Streets will have detailed report.)

* * *

In Denver earlier last month, state highway officials wrestled with problems of their own. Many of them were of long standing; others relatively new. One pressing chore for the American Association of Highway Officials was to forge a decision on what consideration highways should receive in the forthcoming National Transportation Policy.

Working toward a November deadline, several transportation experts in the Department of Commerce have been trying to draft such a document. Presumably, it will spell out the federal government's responsibilities for developing the various forms of transportation. In urging proper attention to highways, the AASHO asked:

> That people still be permitted to choose how they will travel, and that such decisions not be made by planners who may think another method is more "efficient." This is the heart of the controversy, for example, over whether governments should curtail use of automobiles in downtown areas by diverting highway revenues to assist commuter rail service.
>
> That federal-aid for highways should continue to be apportioned to the states (rather than directly to municipalities for big urban projects, as some have advocated recently).
>
> That contract controls be eliminated and the contract authority procedure Traditional in highway federal aid be restored.

(continued on next page)

That the determination of sizes and weights for commercial vehicles be left to the states.

The truckers hailed the last policy statement as a step toward repeal of the provision in the 1956 Act which would deny federal aid to any state permitting weights in excess of certain axle loads or vehicle widths. The AASHO stand calls for uniformity through state compacts rather than the imposition of federal policy.

Highway officials in other states are bristling over the Department of Commerce's allocation of an additional 145 miles of Interstate System routes to West Virginia. The implication is that it was a political pay-off which will drop many millions of dollars worth of new roads into the state. It is expected that the new road authorized will serve as a connector to the floundering West Virginia Turnpike. Also that the construction will help unemployment in the state, which has become a chronically depressed area.

There is plenty of competition for the 105 miles of Interstate mileage which the department has left for contingencies. In fact, requests from the various states total close to 15,000 miles.

* * *

The Department of Commerce has named a man to fill the new job of deputy federal highway administrator, immediate assistant to FHA Rex Whitton. D. Grant Mickle, well-known to the highway fraternity as director of the Automotive Safety Foundation's traffic engineering wing, was called to the post last month. Highway representatives here are pleased with the choice. Mr. Mickle's background in urban transportation will strengthen the Bureau's position in this complex area.

Another appointment of significance to highway interests: Prof. John C. Kohl of the University of Michigan, has been appointed assistant administrator of the Housing and Home Finance Agency, with responsibility for directing the federal government's newest move into the urban transportation situation. Congress last session gave the agency $42½ million to help cities solve their transportation problems. To the relief of highway men, Professor Kohl has declared he will not take an "anti-auto" attitude and foresees that buses will remain the backbone of mass transportation in most cities "for a long time to come.

* * *

It will be a federal offense for contractors to make political contributions or kick-backs to state highway officials, if a bill introduced by Florida Congressman William Cramer is adopted. The legislator is determined to press for passage of his proposal, he says, and predicts that the next session of Congress will produce considerable support.

Most beautiful road . . . A 24-mile stretch of Interstate highway in Maine has been chosen by Parade Magazine for the publication's first annual Scenic Highway Award. Much credit for the recognition goes to the Better Highways Information Foundation for helping organize the project . . . another example, incidentally, of how the Foundation is drawing public attention to highway needs and benefits.

With little fanfare, roadbuilding industry representatives this month are again raising money in each state for BHIF's 1962 campaign. Contractors, equipment distributors, and manufacturers are again putting their money back of the drive. Meanwhile, a date has been set for the next National Highway Week (May 20-26) and the public relations directors of the state highway departments and good roads groups are planning to meet in Kansas City in January to thresh out details.

**WORTHINGTON COMPRESSOR NEWS:**

## PORTABLE COMPRESSOR COMPETITIVE ANALYSIS CHART

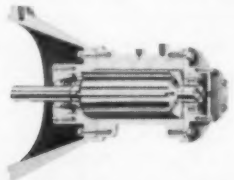
| FEATURE OR BENEFIT | MONO-ROTOR | TWO-STAGE | SCREW-TYPE |
|---|---|---|---|
| DESIGN PROVEN IN CONSTRUCTION INDUSTRY | YES | YES | NO |
| ONE STAGE | YES | NO | YES |
| SINGLE ROTOR | YES | NO | NO |
| MAIN BEARINGS | 2 | 4 | 4 |
| TIMING GEARS | NO | SOME | YES |
| OIL SEALING | YES | YES | YES |
| SIMPLE CYLINDER SHAPE | YES | YES | NO |
| OIL PUMP NEEDED | NO | YES | YES |
| CRITICAL ALIGNMENT OF ROTORS | NO | NO | YES |
| TOTAL WEIGHT | LEAST | MORE | MORE |
| AVAILABILITY | NOW | NOW | ? |
| CLUTCH | YES | SOME | NO |
| FEWEST PARTS | LEAST | MOST | MORE |
| MAXIMUM AMBIENT TEMPERATURES | 125° | 125° | 115° |
| WARRANTY PERIOD | 1 YEAR | *90 DAYS | *90 DAYS |
| FIELD PROVEN | YES | YES | NO |

*(USUAL)

# ANALYSIS PROVES THAT NEW MONO-ROTOR HAS BEST DESIGN

The easiest way to evaluate the compressor designs available today is to draw your own comparison chart. Above is one such chart covering many valid points of comparison between three compressor designs available—the screw type, the two-stage rotary and the new Worthington Mono-Rotor Blue Brute compressor. It clearly shows the new Mono-Rotor's superiority.

The new Worthington Mono-Rotor compressor is built with just one stage . . . just one rotor . . . just two bearings . . . no gears and no oil pump. It is obviously less complex than either of the other designs.



THE MONO-ROTOR HAS 1 ROTOR... 2 BEARINGS... NO GEARS... NO OIL PUMP

What proof of dependability is there for the Mono-Rotor? Over the last three years, this new compressor has been given what is probably the most thorough field testing ever given any compressor introduced to the construction industry. Tests have been so satisfactory that Worthington has extended the Warranty of these units to one full year from the usual 90-day period.

NEW 125' MONO-ROTOR COMPRESSOR

One of the most important points of comparison is the high temperature capability. The Mono-Rotor performs satisfactorily in the up to 125°F temperatures encountered in many domestic and foreign regions.

Note, too, that Worthington retains the clutch in the Mono-Rotor. Not necessary in daily operation, it still is helpful for very cold weather starting—and a real convenience in engine servicing.

Not noted in the chart is the fact that the new Worthington Mono-Rotors are 20% lighter in weight and are designed for improved towing and tracking. The third wheel is standard. It runs all day on one tank of fuel and has other features, too.

The Mono-Rotor Blue Brute can now be ordered in the 85', 125' and 250' sizes. See it . . . rent it . . . or buy it at your Worthington dealer listed in the Yellow Pages under "Compressors". Or write Worthington Corporation, Dept. 60-38, Holyoke, Mass. In Canada, Worthington (Canada) Ltd., Brantford, Ontario.

WORTHINGTON

PRODUCTS THAT WORK FOR YOUR PROFIT

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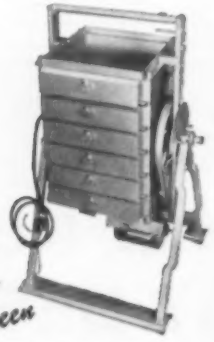
GILSON TEST-SIZING EQUIPMENT

GILSON TESTING SCREEN

Handles up to 1 cu.ft. of concrete aggregates, coal, or minerals; 2 to 7 simultaneous separations in about 3 min.; 4" to 200-mesh.



GILSON Porta-Screen

For field inspection, ready-mix, blacktop, concrete products, minerals; portable, operates free-standing; samples up to 25 lbs.; 1½" to 200-mesh.

GILSON SAMPLE SPLITTER

Halves or quarters large samples in seconds; handles any material from sand to 4" aggregates; adjustable openings ½" to 6".

WRITE FOR GILSON CATALOG SHEETS ON THESE AND OTHER GILSON EQUIPMENT AND ACCESSORIES

GILSON SCREEN CO.
MALINTA, OHIO

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# People

THE IOWA STATE HIGHWAY COMMISSION has appointed A. F. Faul, materials engineer, to the position of director of engineering to head the Commission's newly formed division of engineering. Faul has served the Commission continuously since 1920.

Thomas E. McElherne, assistant materials engineer, was named to replace Faul as materials engineer, and Clarance DeYoung was promoted to assistant materials engineer.

On July 1 in 1960 the Commission adopted a new organization plan which puts all activities under the three divisions of Engineering, Planning and Services. The post of Director of Engineering has been handled recently by deputy chief engineer R. M. Tutton.

A. F. Faul

ROBERT W. SWEET is the new chief engineer of the New York State Department of Public Works at Albany. Moving from the position of district engineer at Watertown, where he has served since 1952, he succeeds Henry Ten Hagen who retired recently. Mr. Sweet had been acting chief engineer since last January.

Except for a period during World War II when he was in the Seabees, Mr. Sweet has served the New York Department continuously since 1923.

JOHN T. REINHARD has joined the field engineering staff of The Asphalt Institute as district engineer. Recently president of Hydro Mat Linings, Inc., he has a wide background including work with the bituminous laboratory of the Bureau of Reclamation at Denver. For several years he headed the bituminous paving section of the Toledo (Ohio) Testing Laboratory.

ROBERT BOYD has retired as maintenance engineer of the Iowa State Highway Commission, which post he has held since 1954 in a 34-year tenure with the commission. He is succeeded by Foster Smiley, also a veteran of the staff.

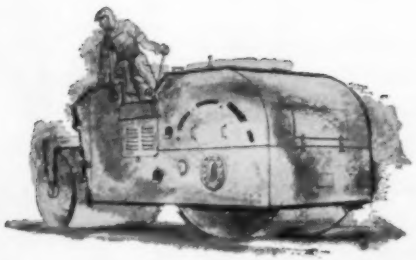
DAVID H. COMANN has been appointed Iowa district engineer, Portland Cement Association, with headquarters at Des Moines. He succeeds Fred F. Loy, who died recently. Comann who has served PCA in Iowa since 1953 is a member of the Iowa Engineering Society and the Des Moines Engineers Club, and is a registered professional engineer.

WILLIAM A. RUSCH is the new Executive Secretary-Treasurer of the American Bridge, Tunnel and Turnpike Association, Inc., with headquarters Suite 900 Woodward Building, 15th and H Streets, N.W., Washington 5, D.C.

Mr. Rusch was recently Planning Director of the City of Albuquerque, New Mexico, and was the director of the recently dissolved National Committee on Urban Transportation, in Washington.

PAUL THORN, of Thorn Construction Company, Springville, Utah succeeds Kenneth S. Witt, of Provo, as president of the Intermountain Branch, Associated General Contractors of Utah.

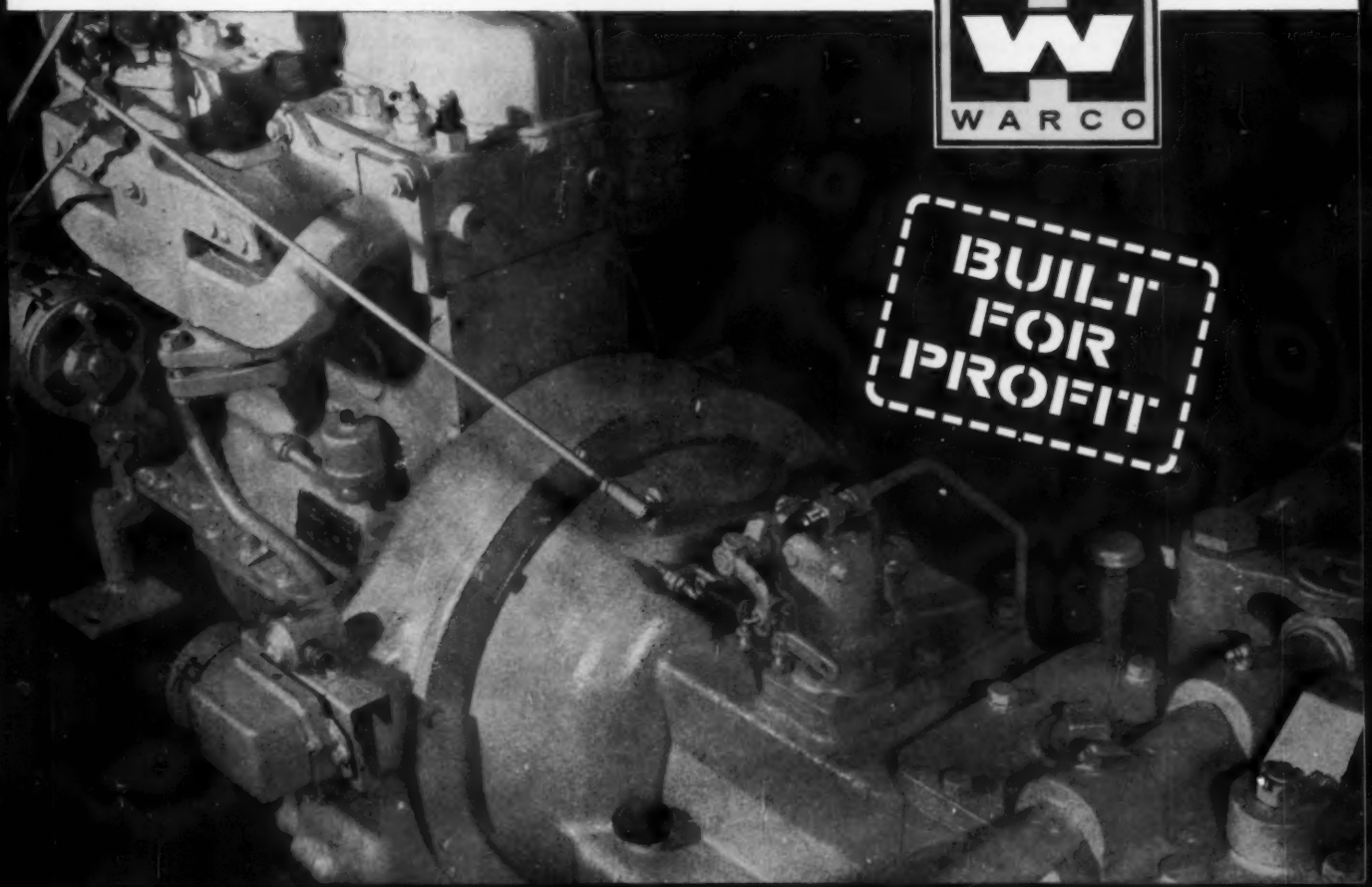
# *Profit insurance built in*



Economy of operation is probably one of your most important considerations when purchasing new equipment. It's one of our prime concerns, too. That's why there is a torque converter and tail shaft governor on every Huber-Warco tandem roller. What does this mean to you? It means power when you need it for faster, better jobs at less cost. For instance, the Huber-Warco torque converter doubles available power — instantly, cuts fuel consumption, does away with the master clutch, scuffing, stalling and overloading. And most important, increases the life of the engine, gears and other vital parts as much as 50%. The operator doesn't have to worry when working on grades either, because the tail shaft governor automatically maintains the rolling speed, within close limits, set by him. Means a better rolling job, too, because after he presets the speed he can forget it and concentrate on the job. These are but a few of the benefits you get with Huber-Warco tandem rollers. Check your Huber-Warco distributor. He'll give you all the details.

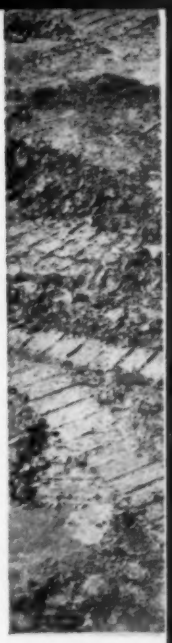
**HUBER-WARCO COMPANY** • MARION, OHIO, U.S.A.

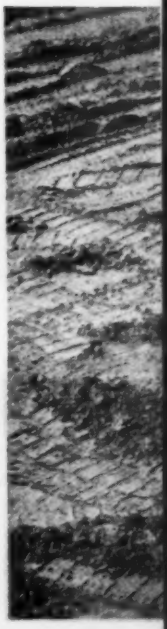
HUBER W WARCO

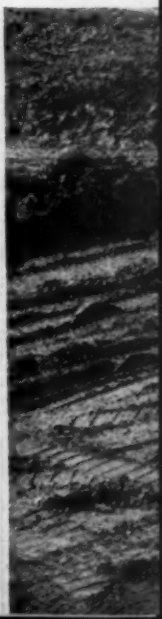


## NOW...ALLIS-CHALMERS BRINGS YOU

# NEW HD 7G FULL POWER STEERING BRAKING SHIFTING







**A new combination of full power control—hydraulic steering, braking, and shifting—brings new output capacity and ease of operation to Allis-Chalmers 1¾-yard HD-7G. With a 100-hp turbocharged engine and torque converter drive, there's plenty of smooth, production-boosting power in this outstanding tractor shovel.**

**Easy! Power steering and power brakes**—not only new ease of operation . . . but reduced maintenance and unusually long-life service as well! The reason—steering clutches and brakes run in a complete oil bath. Runs cool, with minimum brake adjustment, no steering clutch adjustment necessary at all!

**Economical! Allis-Chalmers *7000* Turbocharged engine**—delivers 100 net hp from a combustion system that has established itself as the most efficient in the industry. Controlled turbulence and open chamber combustion design provide a thorough mixing of air and fuel for fast, even, complete combustion . . . matchless fuel economy.

**Fast work cycles with Power-Shift**—The 7G combines smooth torque converter performance with single-lever Power-Shift transmission. You *shift on-the-go*—from any forward speed to any reverse speed, with an infinite number of speeds through the entire working range of up to 5.9 mph forward, up to 4.2 mph reverse.

**Stable! Most track in its class**—With 7-ft, 1⅝ in. of track on the ground, 62-in. tread, and 15-in. track shoes, the HD-7G has the extra stability to handle heaped loads with speed and safety . . . whatever the job, whatever the terrain.

**Smooth! Exclusive Ground-Speed-Control**—No need to limit your speed by shifting into lower gears. Set your speed automatically with Ground-Speed-Control. If you want the tractor to run at 2 mph, it moves at that speed with or without load, up to full engine power. There is no speed-up when the load is lightened, no slowdown when it is increased. You get smooth operation throughout the work cycle . . . top production all day long.

*STEP UP YOUR*

**P**erformance
**O**perator comfort
**W**earability
**E**ase of maintenance
**R**eliability

Your Allis-Chalmers dealer will be glad to arrange a full-scale demonstration on your job at your convenience. *Allis-Chalmers Construction Machinery Division, Milwaukee 1, Wisconsin.*

*WITH* **ALLIS-CHALMERS**
*POWER FOR A GROWING WORLD*

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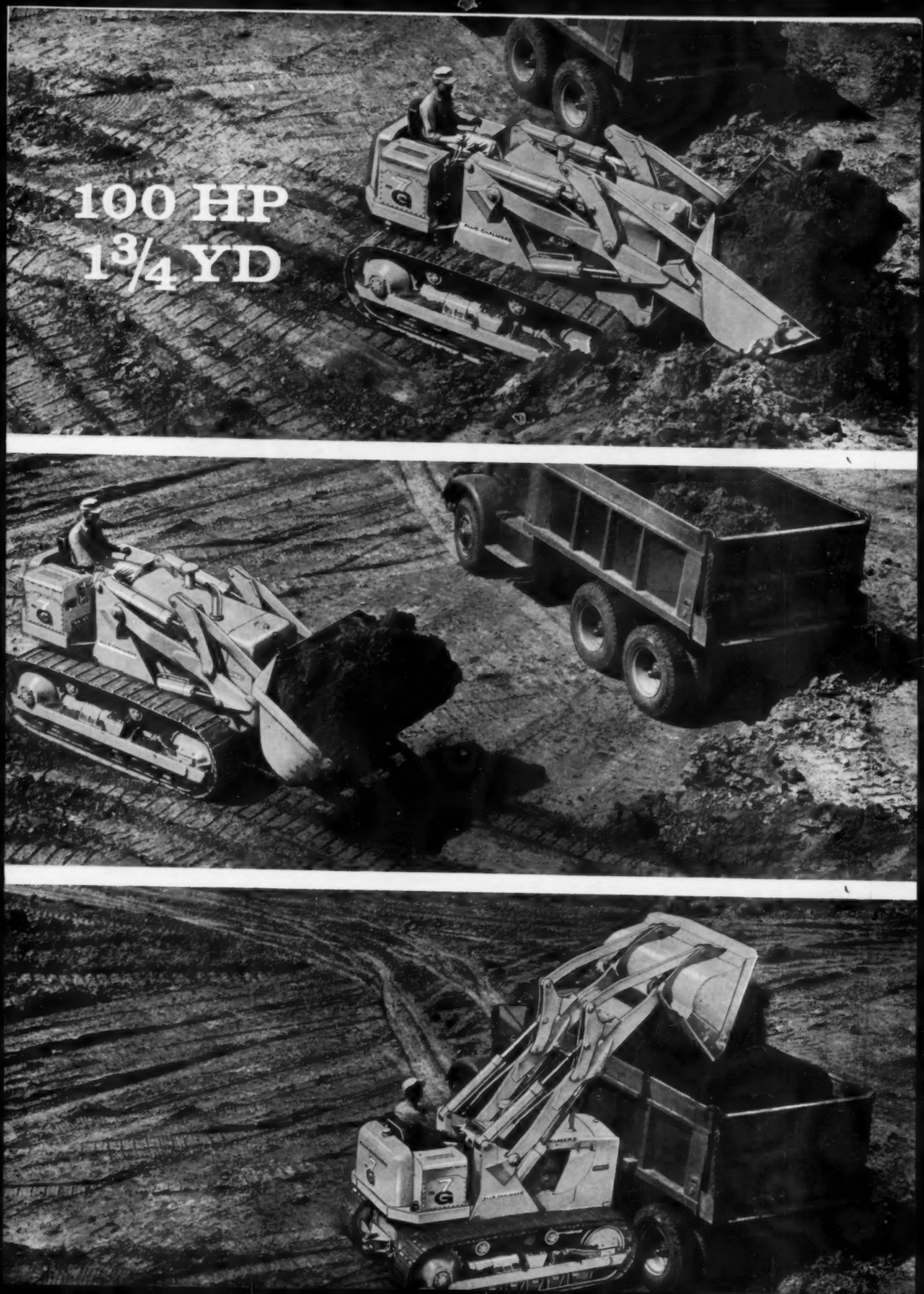
100 HP
1¾ YD

# Ex Uno Plura

**(out of one, many)**

From a single basic design, a complete engine line. That's GM Diesel's unique *family of engines concept.*

Pioneered in the thirties—and proven by over 90 million horsepower—it concentrates all GM Diesel's resources on the perfection of a *single basic cylinder design for all engines.* What does this unique *family concept* mean to you?

It means you can meet every power need, from 20 to 1008 h.p., by using engines of just 2 different cylinder sizes—with up to *70% interchangeability of parts* between engines in each series.

It means *lower parts costs*—up to 50% less than for Diesels built in a flock of different designs and cylinder sizes. Lowest servicing costs, too.

It means you can *meet growing horsepower needs* (without loss of existing parts inventory or maintenance know-how) merely by stepping up to the next engine in the series.

It means that all the advances of the past, present and future can be applied to *every* GM Diesel—whether it's in equipment you've had for 20 years, or one that's just off the line.

It means *the ultimate in standardization benefits,* with greater profits per engine on every GM engine you add.

No wonder so many equipment buyers specify GM Diesel power. Ask for it in your next piece of equipment.

Detroit Diesel Engine Division, General Motors, Detroit 28, Michigan. (In Canada: General Motors Diesel Limited, London, Ontario.)

# GM DIESEL

SERIES 53 & 71 ENGINES

**One proven design throughout the line builds greater value into every engine**

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## Publications

### HRB Publishes New Bulletin on Compaction

Factors that Influence Field Compaction of Soils. Bulletin 272. Highway Research Board, 2101 Constitution Ave., N.W., Washington 25, D.C. 254 pages. Price $4.00.

A comprehensive source book on earthwork compaction, intended to be of prime importance to design engineers and construction men. Its contents run the gamut of practical compaction subjects, including material on performance characteristics of various types of compactors, methods used to maintain control of moisture content and density, and the results of numerous compaction experiments involving various types of soil and equipment.

A separate section is devoted to developments in compaction equipment. Another section presents state highway practices expressed in terms of specification requirements for compaction of various elements of the road structure. Still another section presents manufacturers' specifications for compaction equipment.

### Soils Clinic Proceedings

Entitled "Soils," a 218-page multigraphed Proceedings has been published covering the papers and discussions given at the 12th Annual Road Builders' Clinic, Washington State University of Technology, Washington University, Pullman, Wash. Copies are $3.00 each on request to the Institute's Office of Technical Extension Services.

Considered by some observers as one of the best "wrap ups" of the practical phases of earthmoving and soils control in highway work, the proceedings include papers by top experts on equipment selection and use (earthmoving and compaction); units of pay for earthwork; soils as a construction material; soil investigation and classification; water table; slope failures; soil settlement; stabilization practices; frost action; culvert foundations and backfill; specification writing for earthwork; and a panel discussion on modern soil testing.

*Continued on page 32*

**Will Never Owe You Anything!**

Your OWEN Clamshell Bucket starts making money for you from the first hefty mouthful it bites off . . . and keeps on making money because its rugged construction "stands up". It's the bucket with "The Big Bite that's Just Right!"

The OWEN has a strong appetite for work—an appetite that is never satisfied. These are exclusive features that keep it working for you:

**Block and Tackle Type Reeving** — **Recessed Lips**
**One-piece Head Construction** — **Single Main Shaft**
**Riveted Bowl Assembly**

Prompt service through ample inventory on new equipment and parts.

Write for OWEN information on how these features can make money for you.

The OWEN BUCKET COMPANY
BREAKWATER AVENUE • CLEVELAND 2, OHIO
BRANCH OFFICES: New York • Philadelphia • Chicago • Berkeley, California • Fort Lauderdale, Florida
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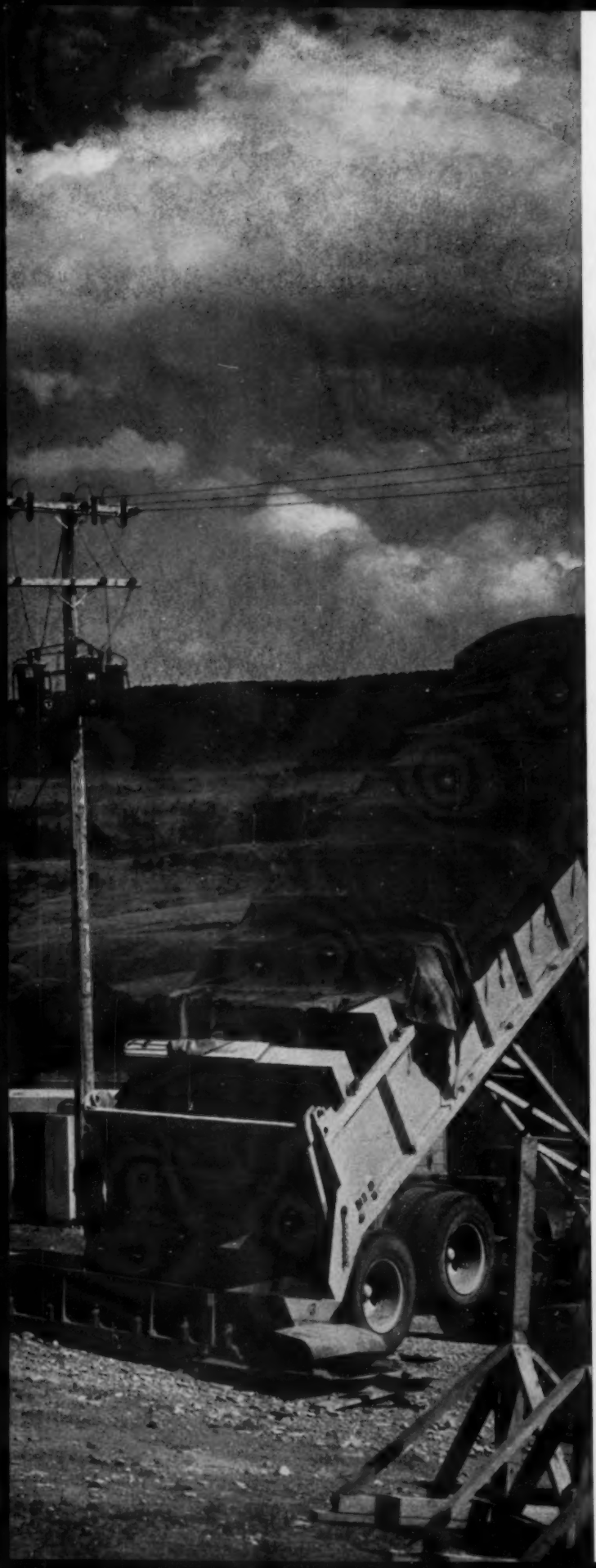

# "Minute Mixing"

## ...on the spot...speeds Minuteman ICBM base construction

How do you pour concrete for 150 missile silos and 15 launch control centers — when they're scattered over a 20,000 sq. mile area? Conventional methods are out. Central plant mixing would require grueling 50-mile truck hauls — with segregation and equipment wear and tear. Portable plants would require almost perpetual erection and knock-down operations. The answer then: *eliminate* the conventional batching/mixing plant!

That's exactly what T. L. Smith did.

Working with subcontractor and contractor, Smith engineers mounted a Turbine mixer, plus water tank and metering equipment, on a flatbed truck. Then compartmented semi-trailer trucks could dump premeasured dry batches onto a Smith-Gregco conveyor for charging the Turbine. Thoroughly mixed concrete comes out in *60 seconds* for immediate placement by crane bucket.

Operating on a one-minute cycle, these truck mounted plants represent a totally new concept in the mixing and delivery of concrete *at* the job site. They have the speed and mobility of a truck mixer, the production capacity of a conventional batching/mixing plant!

Result? Vital ICBM silos and support facilities are being completed on schedule — practically and economically.

This is the kind of creative engineering and wholehearted cooperation you get from Smith. It's the reason why so many contractors and concrete suppliers look to Smith for significant break-throughs in the science of mixing and transporting concrete!

SMITH **THE T. L. SMITH COMPANY**
Milwaukee, Wisconsin / Lufkin, Texas

*Affiliated with Essick Manufacturing Company, Los Angeles, Calif.*

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*Because versatility counts*

# HENDRICKSON BROS. COUNTS ON MACKS

**Macks move the earth**—Hendrickson Bros. uses these versatile B-42S Mack dumpers on this earth moving project at Heckscher State Park, Long Island. Dependability makes Macks first choice with experienced operators.

On fast-changing Long Island, N. Y., Hendrickson Bros., Inc. takes on a unique "mix" of construction projects impossible for a less versatile organization. From its Valley Stream, Long Island headquarters, Hendrickson supervises operations ranging from storm sewer projects to major super-highway construction . . . from asphalt paving to involved railroad grade crossing eliminations in busy suburbs of Greater New York City.

Hendrickson's highly regarded reputation for "getting the job done" is due in part to its insistence on working with quality equipment. As Milton A. Hendrickson, President, puts it, "Construction jobs demand a lot of a truck. We use Macks because we're sure they'll do each job the way we want it done. To our way of thinking, an investment in a Mack is one that pays off."

Mack trucks pay off because of Balanced Design—the exclusive Mack concept in which every major component is *Mack built* to work together for the highest efficiency and long life. Engines, clutches, transmissions, axles, drives — all major components are *made by Mack* for Mack trucks alone . . . made to the highest standards of the industry to work together for maximum efficiency and long life.

Whether you use one truck or dozens, you'll find a profitable difference in using Macks. Your Mack representative is qualified by knowledge and experience to help you determine the Mack models that most economically meet your trucking needs. Mack Trucks, Inc., Plainfield, New Jersey. Mack Trucks of Canada, Ltd., Toronto, Ontario.

6347

**MACK**
FIRST NAME FOR
**TRUCKS**

**Good going or bad**—Speeding down a stretch of new parkway or slogging off highway to the dump site, Macks are assured maximum traction, thanks to the exclusive Mack Balanced Bogie with automatic Power Divider interaxle differential, an example of all-around Mack versatility.

# Publications

*Continued from page 27*

## Design Charts for Open-Channel Flow

Design Charts for Open-Channel Flow. Third in a series on the hydraulic design of highway drainage structures. Bureau of Public Roads. Available from the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C. Price $0.70.

The 105-page publication contains 82 charts which provide direct solution of the Manning equation for uniform flow in open prismatic channels of various cross sections; instructions for using the charts; a table of recommended values of $n$ in the Manning equation; permissible velocities in earth and vegetated channels, and similar data.

## Calcium Chloride and Salt De-Icing Mixtures

In recent years, there has been greater need to achieve clear, dry pavements after winter storms quickly, and at low cost. Chemical mixtures were first used by toll road officials who sought new means of clearing pavements fast. Mixtures are now adopted by many state highway departments, and county and municipal maintenance organizations.

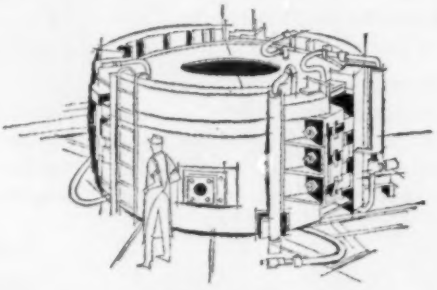
The Calcium Chloride Institute has issued a publication giving basic data on the use and storage of chemical mixtures and procedures for mixing. Entitled "Calcium Chloride and Salt Mixtures," it is available free on request to the Calcium Chloride Institute, 909 Ring Building, Washington 6, D. C.

## Blending Aggregates To Meet Specifications

A university professor of civil engineering has developed a mathematical method for determining the most economical combinations of aggregates for various types of concrete. It replaces the trial-and-error methods of computing the percentages of several aggregates. The procedure is contained in one of four papers in "Concrete Quality Control, Aggregate Characteristics, and the Cement-Concrete Reaction," Bulletin 275, Highway Research Board, 2101 Constitution Ave., Washington 25, D.C. Price $1.40. The author is Professor Charles Sargent, chairman of the department of Civil Engineering, University of Alaska.

CONSTRUCTION PERFORMANCE OF SOME SOUTHERN ONTARIO SANDS. By David Townsend and Bruce Hutchinson. Report of an investigation by the Department of Civil Engineering, Queens University, with the Ontario Department of Highways (under Ontario Joint Highway Research Program). June, 1961. Report No. 8, Queens University, Kingston, Ontario, Canada. Covers geological extent of sands, use as highway cushion, gradation and analysis, field behavior, interrelation of sand properties.

*Continued on page 35*



**Miss Southern Tire Announces:**

**Something BIG!**

**World's Largest Retreading Mold**

Southern Tire Company now offers the largest production capacity and range of sizes of any retreading shop in the world. New equipment enables Southern Tire to retread sizes no other plant can handle. Southern's new giant-tire mold, occupying an area of 2000 square feet, can handle the following sizes: 26.5 x 29, 29.5 x 35, 3000 x 33, 33.5 x 39 and 37.5 x 33.

***For quality rubber, on-site pick-up and delivery, specify an Independent — specify Southern Tire.***

**SOUTHERN TIRE COMPANY**

1414 Broadway
SHEFFIELD, ALA.

Phone Collect
EV 3-2312

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# Heavy loads shorten concrete road life... CF&I Welded Wire Fabric lengthens it

In modern concrete highways, reinforcement with welded wire fabric is important. Without it, major arteries don't stand up well against pounding tires and heavy loads.

When embedded in concrete, CF&I Welded Wire Fabric serves as a steel backbone that literally holds highways together. It cushions the impact of heavy, fast-moving vehicles by distributing load stresses and minimizing cracking. And these are the things that make the difference between long, trouble-free road life and expensive maintenance operations.

Put CF&I Welded Wire Fabric to work in your roads. It meets all ASTM specifications and is available in a wide range of gages and spacings to meet virtually every type of reinforcing requirement. Call your nearby CF&I sales office for complete details.

**THE COLORADO FUEL AND IRON CORPORATION**

**Denver • Oakland • New York**

**Sales Offices in Key Cities**

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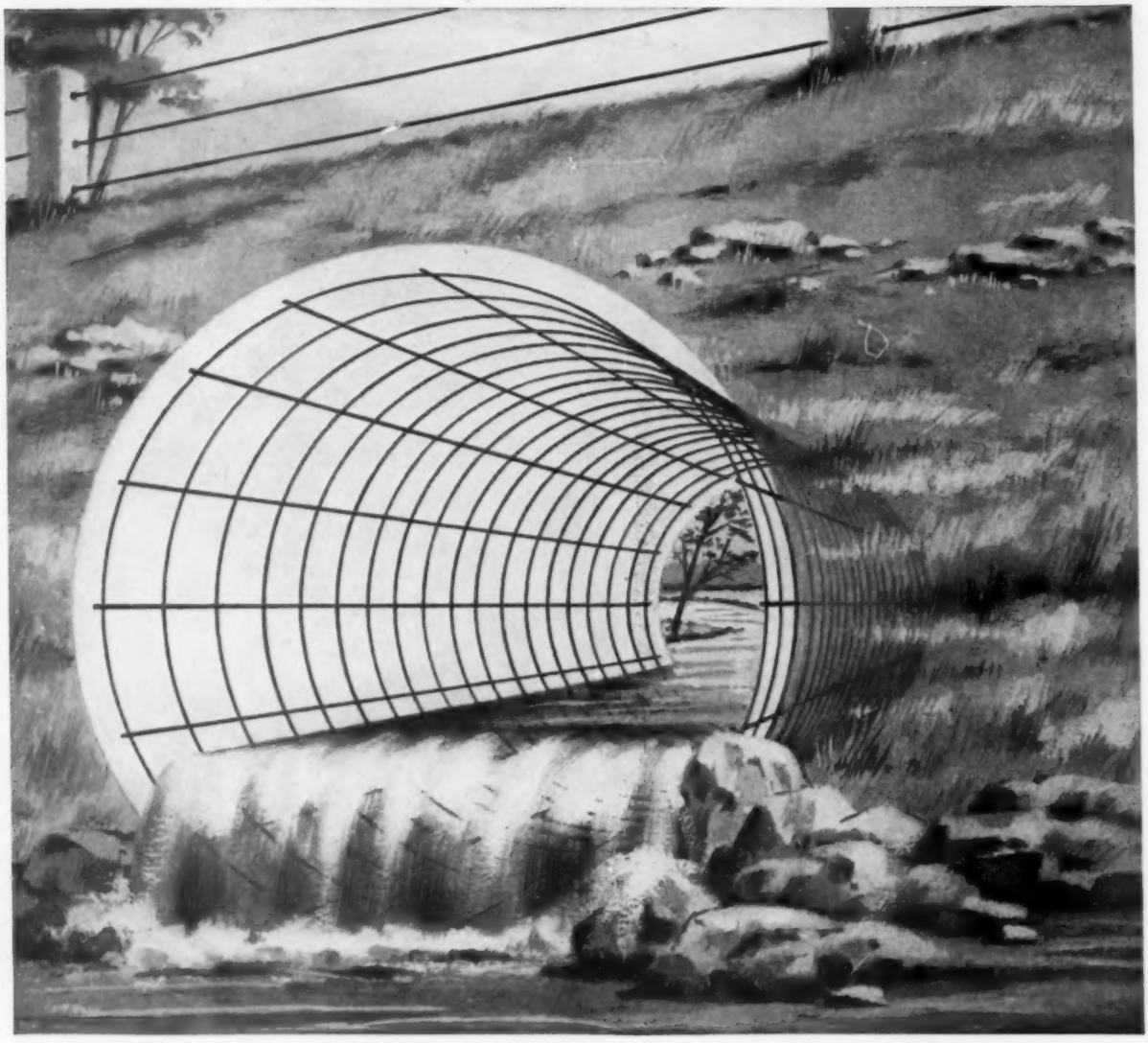

# Interested in pipe life?

## CF&I Welded Wire Fabric lengthens it

In culverts and drainage systems, concrete pipe has to fight a constant battle against external pressures. But it has a powerful ally in CF&I Welded Wire Fabric.

Reinforcement with this tough steel mesh combines the strength of steel with the permanence of concrete. The result is pipe that has greater structural strength, maximum corrosion-resistance, and the overall toughness that means long, maintenance-free life.

CF&I Welded Wire Fabric meets all ASTM specifications and is available in a wide range of gages and spacings to meet virtually every requirement. Ask your CF&I salesman for complete details.

**THE COLORADO FUEL AND IRON CORPORATION**

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# Publications

*Continued from page 32*

LANDSLIDE INVESTIGATIONS. Published by the U.S. Bureau of Public Roads. 67 pages (4-¾ x 7-¼); 31 illustrations and diagrams.

A field handbook on landslides and related phenomena, primarily for the highway location engineer but also of interest to other engineers, geologists, teachers, and students. Contains chapters on geologic processes, rocks and soil types, and geologic structures involved in landslides, phenomena foreshadowing slides; landslide prevention, control and correction; mapping and reporting slides.

19TH SHORT COURSE ON ROADSIDE DEVELOPMENT. Proceedings of conference held October 4-7, 1960, at Columbus, Ohio. 149 pages. For a copy write Wilbur J. Garmhausen, chief landscape architect, Ohio Department of Highways, Columbus 15, Ohio: or professor Charles R. Sutton, School of Architecture and Landscape Architecture, Ohio State University, Columbus 10, Ohio.

This proceedings contains 27 papers or discussions, from a conference that drew speakers and delegates from 38 states.

PAVEMENT EDGE MARKINGS, SHOULDERS AND MEDIANS. Bulletin 366. Highway Research Board, 2101 Constitution, Washington 25, D.C. Price $2.80. Six papers given at the Board's 39th annual meeting on phases of this subject covering effect of markings of accident frequency and driver behavior, and in relation to median and shoulder studies in several states.

BRIDGE DESIGN STUDIES AND PILING TESTS: 1960. Bulletin 279, Highway Research Board, 2101 Constitution Ave., N.W. ,Washington 25, D.C. Price $1.80. Contains four reports on studies at Iowa State, Texas and Missouri universities and by the Kansas and Missouri highway departments.

QUALITY AND THEORY OF TRAFFIC FLOW. A symposium by Bruce D. Greenshields, Henry P. George, Neal S. Guerin, M. R. Palmer, and Robin T. Underwood; Bureau of Highway Traffic, Yale University, Strathcona Hall, New Haven, Connecticut.

This 188-page publication contains chapters on quality of traffic flow, measurement and evaluation of traffic congestion, travel-time relationships, why traffic congestion develops, and the relationship between speed, volume and density. The purpose of the symposium was to interest others in continued research in such aspects of traffic prediction, planning, and control.

UTAH 22ND ANNUAL HIGHWAY CONFERENCE PROCEEDINGS. Bulletin 113, Utah Engineering Experiment Station, Department of Civil Engineering, University of Utah, Salt Lake City.

Covering conference of March 6-7, 1961, the proceedings include twelve selected papers on highway administrative matters, urban traffic planning, asphalt paving, seismic analysis as aid to decision on rock ripping, and a 4-paper symposium on specifications.

CONCRETE PAVEMENT DESIGN AND PERFORMANCE STUDIES: 1960. Bulletin 274, Highway Research Board, 2101 Constitution Ave., N. W., Washington 25, D.C. Price $3.40. This 160-page publication gives test results on performance of continuously reinforced and non-reinforced concrete pavements, joint spacing, skewed joints, other design features.

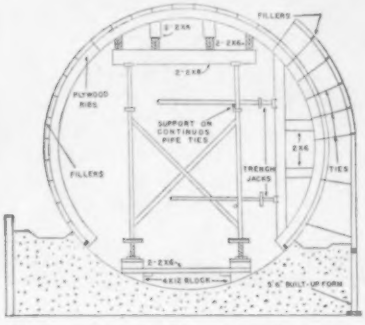
ECONOMIC EFFECTS OF AN INTERSTATE HIGHWAY BYPASS, LEBANON, MISSOURI. Report published by the Missouri State Highway Department, Division of Highway Planning, in cooperation with the U. S. Bureau of Public Roads. An important new source of data on this subject helpful to planners and administrators.


# 60 minutes!

**Strip, move, position 32′ gang form section in just one hour . . .**

National Engineering and Contracting Co., Cleveland, relied on Symons steel-ply forms to pour a huge quarter mile sewer.

The $400,000 sewer is 13 feet in diameter and 15 inches thick. To meet the 3½ month contract deadline, the inside was formed with three sets of jumbo-mounted Symons forms similar to a gang section. These "jumbos" had hinged ribs




Cross section showing construction features of jumbo form. Workmen, with a block and tackle manually pulled the "jumbo" 30 ft ahead for the next pour.

and rode on plank rails. Each section was 32′ long and was constructed with 12 inch by 8 foot Symons steel-ply fillers. Workmen were able to strip, move a section 30 feet and re-position in one hour. Symons new gang-form bolt simplified assembling and stripping by allowing the ties to be broken back before moving the sections.

For the *complete story, write us.* Ask also about our free engineering service . . . rental-purchase options . . . and complete line catalog.

Symons

**SYMONS CLAMP & MFG. CO.**

4283 Diversey Ave., Dept. L-1, Chicago 39, Ill.

Warehouses Thruout the U.S.A.

*MORE* ***SAVINGS*** *FROM* ***SYMONS***

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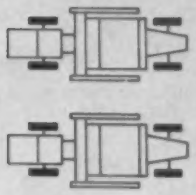
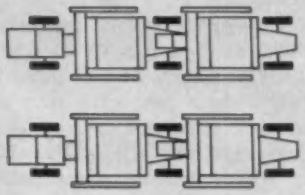
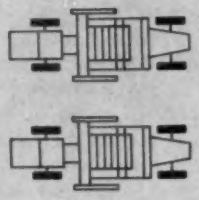
## all "small" scrapers... but the flexibility is BIG



Two D Tournapulls® with single LW scrapers



Two D Tournapulls with tandem LW scrapers



Two D Tournapulls with Hancock scrapers

*D 'Pull* fleet owner since 1955*

# adds tandems and Hancocks... widens job and profit opportunities

Name any size job from 500 to 500,000 cu yds... Robertson Construction, Ltd., of Prince Albert, Saskatchewan can handle it at a profit.

Since 1955, when he bought one LeTourneau-Westinghouse D Tournapull, L. F. Robertson has been carefully building flexibility into his earth-moving fleet. His scraper spread now consists of:

2 D Tournapulls with single scrapers.
2 D Tournapulls with tandem scrapers.
2 D 'Pulls with Hancock elevating scrapers.

Now, look at the wide range of jobs Robertson Construction, Ltd., can handle:

Robertson Construction, Ltd., Prince Albert, Sask., adapts its D Tournapull fleet to fit each job. Here, building a 155,000-cu yd, 8.4-mile grid road near Prince Albert, Robertson equipped two prime-movers with tandem scrapers . . . moved two loads per trip.

Loading one scraper, then the other, the D Tandem loads approximately 15 bank yards of sandy clay and muskeg is an average of 55 seconds. LW Tournatractor® dozer has push-plate on the rear for push-loading in reverse as well as forward to save turn-around time.

Hancock elevating scrapers (Robertson has two of this type in its fleet) load dirt into bowl via blades of electrically driven elevator. You not only do not need a pusher, but use of a pusher is not recommended. D-and-Hancock makes ideal finishing tool.

Traveling over soft sub-grade, a D Tandem arrives at the fill. It spreads the rear load, then front-scraper load over about 100′. Since 1955, Robertson's LW fleet has constructed 122 miles of grid roads, 45½ miles of municipal roads, and several miles of town and city streets.

**Large projects,** like the 155,000-cu yd roadbuilding job illustrated here, are more profitable because he can use 2-loads-per-trip "D" tandems with total heaped capacity of about 18 yds each . . . supplemented by "single" D 'Pulls. The same push-tractors can handle either "single" or "double" scraper units.

**Medium-size jobs** are, of course, a specialty of the single-scraper D Tournapulls. And, where conditions permit, Robertson can quickly tandemize his D 'Pull scraper units for double capacity. At any time, second scraper can be "dropped" (or reconnected) in as little as 15 minutes.

**Smaller assignments** are handled by one or two "D's" with elevating Hancock scrapers that load 10 yds in less than a minute *without a pusher.* Any time Robertson needs *all six* "D's" with regular LW scrapers, the Hancock scrapers are disconnected, and replaced by the "second" scrapers from his tandem units.

**YOU, TOO, can have this dollar-making flexibility.** If you are now an owner of LW Tournapulls, you can very easily tandemize your scrapers to speed production. If you are a non-owner, you can buy "singles" with the assurance that second scrapers can always be added.

Only LeTourneau-Westinghouse offers you *practical* tandem scraper operation . . . in three sizes, capacities up to 64 heaped yds. The secret is *exclusive* electric controls that give you instant, full power, even to the farthest tailgate. Ask for a demonstration . . . no obligation, of course.

L. F. Robertson says D Tournapull tandems are ideal for his work because they have no difficulty turning 180° on the fills for 22′ finished roadways. He calculates the tandem's fuel consumption about 1 (Imperial) gph more than a "single" . . . and reports equipment availability (of his six D 'Pulls, one Tournatractor, two LW 550 motor graders) **has exceeded 95%!**

*Trademark DTP-2476-DCJ-2

**LeTOURNEAU-WESTINGHOUSE COMPANY,** PEORIA, ILL.
A Subsidiary of Westinghouse Air Brake Company
*Where quality is a habit*

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# Diesel Maintenance Not for the Half-Trained

Diesel engine maintenance can hardly be the responsibility of partly-trained men, notes a spokesman of the service department of International Harvester Company's Construction Equipment Division. One of the biggest mistakes a contractor can make, this expert states, is to fail to recognize that only a thoroughly qualified mechanic is competent to handle such an assignment.

Knowing *how* to follow a manufacturer's recommendations is not enough. A diesel engine maintenance man should also know *why* an operation is performed. Any workable maintenance program, such as International's "Scheduled Maintenance," must be flexibly followed based on "why" knowledge.

Only a fully trained man can, for example, be aware of conditions requiring more frequent oil filter servicing. Anyone else simply does not have the know-how to adapt manufacturers' recommendations to meet the needs of a particular job.

Air cleaners usually are slated, on a manufacturers' recommendations list, for daily checking, or "more often," depending on operations conditions. When a fleet works in heavy dust, cleaners probably will need servicing several times daily.

No contractor can afford to have his maintenance crew learn this vital lesson *after* his equipment has been cloaked in dust for a number of days.

International Harvester cites cases where an inexperienced man thought he was doing the proper thing by "setting up" the power on a diesel. The thoroughly-trained mechanic knows that this attempt to reach peak performance actually reduces production over a long period, leading as it does to increased downtime.

All diesel engines are adjusted carefully at the factory to give a proper balance between maximum output and long, economical service. When the inexperienced man sets the injection pump to make it deliver more fuel, the result is incomplete combustion. Shortly, carbon deposits, lube oil dilution and excessive fuel consumption are evident.

There's also trouble ahead when the half-trained mechanic sets up the governor control to overspeed an engine, or when he changes the timing. This man sees only the slight extra horsepower gained from these modifications. The experienced mechanic knows that, in the long run, this type meddling means more downtime and shorter engine life.

## Battery Care Stressed

Proper battery care involving hold-downs and terminals is stressed by the service department of International Harvester Company's Construction Equipment Division.

Too loose or too tight hold-downs can result in considerable damage. Loose mountings will result in damage to the elements, cracking, or wearing of the container and loss of acid. Hold-downs that are too tight can distort and crack the case permitting acid loss from the cells.

Loss of acid will cause corroded terminals and cables, resulting in high-resistance battery connections which, in turn, weaken the battery's power and shorten its life.

When a battery is installed the tapered and clamp terminals should be brush-cleaned and fresh grease applied. If this is not done high-resistance connections can result, making it difficult to keep the battery fully charged.

this is Hanson!

The Hanson mechanical materials handling crane is a rugged, maneuverable rig that is saving time and reducing materials handling and labor costs for thousands of contractors and industrial plant engineers.

To see how a Hanson 3 or 5 ton mechanical, or a 6 ton hydraulic crane can meet your specific needs, call your Hanson dealer or write to Hanson Machinery Co., Tiffin, Ohio.

HANSON

Builders of some of the country's finest shovels and cranes of the smaller capacities.

**MATERIALS HANDLING CRANES** Mechanical and hydraulic. 3, 5 and 6 ton.

**EXCAVATORS** Crawler, rubber and truck mounted: ⅜ to 1 yard shovels; 5 to 25 ton cranes.

*Dealerships in some areas still open.*

HANSON MACHINERY CO.
TIFFIN, OHIO

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# "De-icing with straight rock salt is more efficient and more economical than any other ice control method"

Rock salt has unique de-icing properties not combined in any other single de-icing chemical. Unlike abrasives or other ice-control products, straight salt works three ways to get rid of ice and packed snow:

First, it gives positive traction, even before the salt begins to melt the ice.

Next, its corkscrew action penetrates and breaks up ice, right down to road surface. Leaves no slippery layer of surface brine to re-freeze.

Finally, it undercuts the frozen mass, melting the bond between ice and pavement. Traffic action and snow plows easily throw the resulting slush to the side of the road.

Morton Safe-T-Salt* is a screened and graded straight rock salt. Its name was chosen to emphasize the primary reason for street and highway de-icing . . . public safety. Morton Safe-T-Salt gives that safety quickly, cleanly, and economically.

**MORTON SAFE-T-SALT WILL:**

Provide both immediate traction and quick, effective de-icing.

Spread quickly . . . At the recommended rate of 500 lbs. per mile of 20-ft. pavement, a four ton salt spreader covers 16 miles of highway in one trip.

Spread easily and cleanly. Flows efficiently in mechanical spreaders, leaves no messy residue as sand and cinders will.

Save money on ice control, because it costs less than other de-icing chemicals.

**MORTON SAFE-T-SALT WON'T:**

Irritate skin, damage animals' paws, rot or shrink leather. It is non-toxic, does not harm rubber or fabrics.

Hurt pavements. Will not damage properly seasoned or air-entrained cement, asphalt or brick paving.

Clog sewers and drains, or leave a rutted, messy pavement.

Leave a slippery layer of surface brine, as do other de-icing chemicals, which melt ice on road surface and quickly dissipate in run-off to road shoulders.

*For complete information, call your Morton Salt representative, or write*

## MORTON SALT COMPANY

INDUSTRIAL DIVISION, Dept. RS11, 110 N. Wacker Drive, Chicago 6, Illinois

**Safe-T-Salt is a trademark of the Morton Salt Company*

**. . . for more details circle 310 on enclosed return postal card**

# "Our 48 Ford Trucks have given maximum economy in every way!"

*says Fred Newkirk, Manager of Materials Transportation Company, Inc., Corpus Christi, Texas*

"We are using Ford Trucks exclusively because they provide important savings—starting with a lower initial expenditure. We estimate that each Ford costs us about $1,500 less than other makes of comparable size and capacity. Our maintenance and repair costs are less, too. The greater parts interchangeability on Ford Trucks makes it possible to reduce our parts inventory by about 50%; this frees $2,500 of working capital. And in operating expenses, we save on gasoline because our Fords deliver an extra ½ mile per gallon.

"They have proven more durable, too. For example, our 1958 Ford F-1000 has logged over 160,000 miles without even having the heads or pan off. We expect 200,000 miles from these Super Duties before a major overhaul. Some of our 1955 and 1956 Ford F-900's still have their original brake linings after 300,000 miles.

"Our trucks operate six days a week, and the average fleet mileage is 51,000 miles per week. We haul 48,000-lb. payloads of bulk cement or 37,760-lb. payloads of sack cement for Halliburton Portland Cement Company. Our drivers are also very enthusiastic about these new Ford Super Duties. They report that with 72,000-lb. grosses Fords are smooth riding and easy to handle."

**Solid testimony that Ford's full-time economy only starts with low price!**

**FORD TRUCKS COST LESS**

PRODUCTS OF Ford MOTOR COMPANY

HALLIBURTON
FORD
J-27244

# Meetings

SOUTHEASTERN ASSOCIATION OF STATE HIGHWAY OFFICIALS—Annual Meeting, Hotel Marion, Little Rock, Arkansas; November 27-30.

THE ASPHALT INSTITUTE—Annual Meeting, Shoreham Hotel, Washington, D.C.; December 4-7.

HIGHWAY RESEARCH BOARD—Annual Meeting, Sheraton Park Hotel, Washington, D.C.; January 8-12, 1962.

NATIONAL LIMESTONE INSTITUTE—Annual Winter Meeting, Roney Plaza Hotel, Miami Beach, Fla.; January 15-19.

CALIFORNIA STREET AND HIGHWAY CONFERENCE (14th Annual)—Institute of Transportation and Traffic Engineering; Los Angeles Campus, University of California; January 25-27, 1962.

ASSOCIATED EQUIPMENT DISTRIBUTORS—Annual Convention, Conrad Hilton Hotel, Chicago, Ill.; January 28-February 1.

ASSOCIATION OF ASPHALT PAVING TECHNOLOGISTS—Annual Meeting, Sheraton Charles Hotel, New Orleans, Louisiana; January 29-31.

NATIONAL READY-MIXED CONCRETE ASSOCIATION—Convention and Biennial Equipment Show, McCormick Place, Chicago, Ill.; February 5-9.

NATIONAL CRUSHED STONE ASSOCIATION—Annual Convention and Exposition, Conrad Hilton Hotel, Chicago, Ill.; February 11-15.

NATIONAL BITUMINOUS CONCRETE ASSOCIATION—Annual Convention, Flamingo Hotel, Las Vegas, Nevada; February 17-22.

AMERICAN SOCIETY OF CIVIL ENGINEERS—Regional Convention, Shamrock Hotel, Houston, Texas; February 19-23.

ASSOCIATED GENERAL CONTRACTORS OF AMERICA, INC.—Annual Convention, Biltmore Hotel, Los Angeles, Calif.; February 26-March 1.

AMERICAN ROAD BUILDERS ASSOCIATION—60th Annual Meeting and 8th Annual Highway Materials and Services Exhibit, Sheraton-Place Hotel, San Francisco, Calif.; March 4-7.

AMERICAN CONCRETE INSTITUTE—58th Annual Convention, Brown Palace Hotel, Denver, Colo.; March 12-15.

ASSOCIATION OF HIGHWAY OFFICIALS OF NORTH ATLANTIC STATES—37th Annual Convention, Roosevelt Hotel, New York City, March 22-24.

## Lighting on Iowa Roads

Three more leases have been approved for lighting of rural primary road intersections in continuation of a program aimed at greater highway safety. This brings to 18 the number of such leases approved as part of a program to provide safer night-time driving in Iowa. Under the program, 11 rural primary road intersections, rated as potentially the most dangerous, already have been lighted.

What gives you confidence in a company? One answer is speed. And The Fund, with offices networking the nation, is geared for prompt, accurate service, geared to deliver **all** your insurance needs, including Construction Bonds, Workmen's Compensation, Public Liability, Crime and Builder's Risk. By servicing your **total** account, The Fund can often save you money, lower your bid. Ask your insurance agent or broker to insure through **The Fund of Experience.**

CENTRAL BONDING OFFICES:
3333 CALIFORNIA STREET, SAN FRANCISCO
110 WILLIAM STREET, NEW YORK
Branch Offices in Principal Cities in America

The FUND Insurance Companies
FIREMANS FUND INSURANCE COMPANY
HOME FIRE & MARINE INSURANCE COMPANY
NATIONAL SURETY CORPORATION

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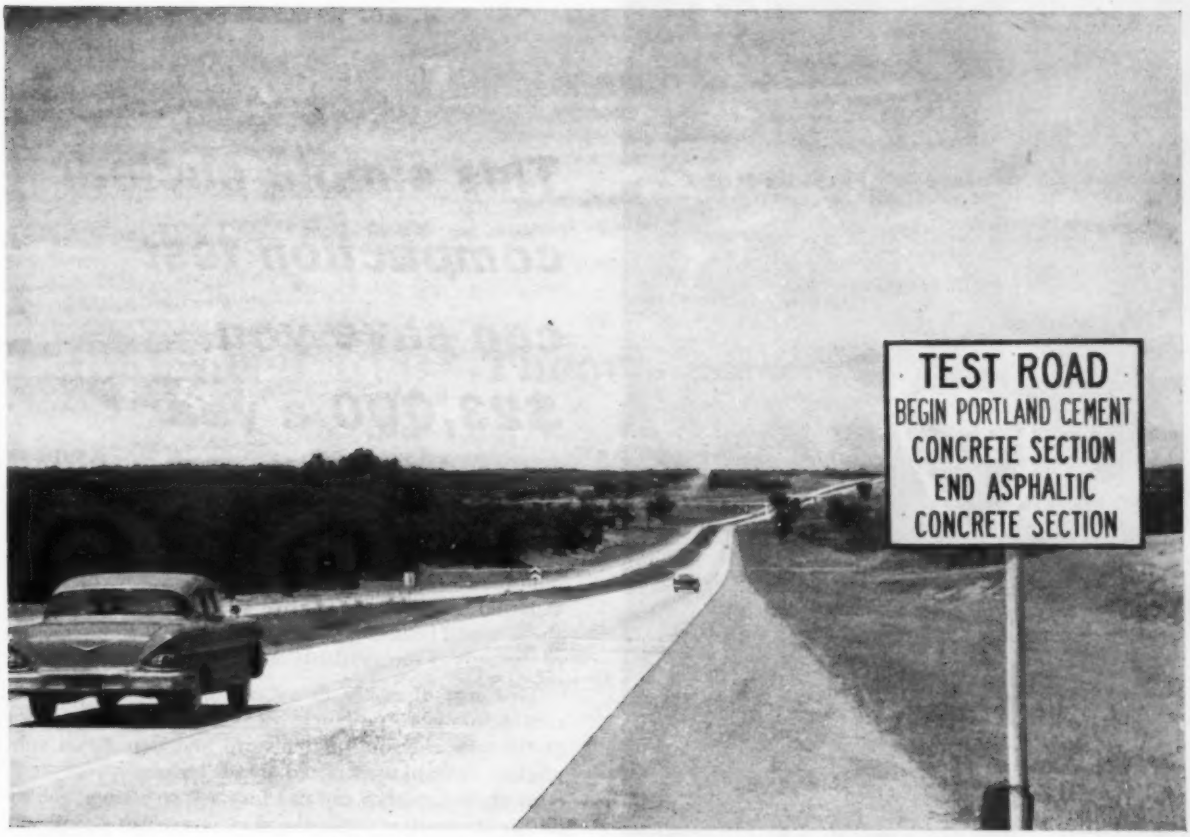


*The Oklahoma Test Road north of Oklahoma City will eventually be part of Interstate route 35*

# concrete wins on Oklahoma Test Road with maintenance cost 65% lower than asphalt!

**5-year traffic test, ordered by the Oklahoma legislature, confirms again the findings of state highway departments and other official tests.** Connecting two-mile sections of concrete and of asphalt, both the best of their type, were built in 1955 on Oklahoma's US 77. For five years beginning Jan. 1, 1956, exact records were kept of all *pavement* maintenance costs. Total for concrete: $557.82. For asphalt: $1,591.87. And not only did the asphalt cost nearly 3 times as much to maintain during the five years—it is already getting its first resurfacing at an additional cost of $43,753.

Substantial maintenance economy is one reason why concrete is the choice of so many states today. Engineers are designing concrete pavements to last 50 years and more. It's the one pavement that can be designed *mathematically* to meet specific wheel load requirements. It's the only pavement with beam strength and stability.

The Oklahoma Test Road proves again the long-term value of concrete pavements. The first cost isn't just a down payment. Concrete provides true economy for Interstate highways as well as for other heavy-duty roads.

**Complete resurfacing after only five years adds another $43,753 to asphalt's upkeep!**

Despite continued surface maintenance for five years, the asphalt pavement on the Oklahoma Test Road has deteriorated to the point where complete resurfacing is required. The asphalt sections are being overlaid with 1½ inches of surfacing to seal out moisture and provide a new wearing course. When comparison is made, as shown here, on the basis of *total upkeep* cost, concrete's advantage is dramatic.

**CONCRETE**

| | |
|---|---|
| 5-year surface maintenance | $557.82 |
| total surface upkeep | $557.82 |

**ASPHALT**

| | |
|---|---|
| 5-year surface maintenance | $1,591.87 |
| complete resurfacing | $43,753.00 |
| total surface upkeep | $45,344.87 |

**PORTLAND CEMENT ASSOCIATION**

*A national organization to improve and extend the uses of concrete*

# *This simple nuclear compaction test can save you $23,000 a year*

A NATIONWIDE SURVEY of 1,200 large road-building and earth-moving contractors revealed that compaction equipment dead-time, call-backs, and lost man-hours cost them an average of $23,000 a year. They reported reluctance to move equipment and crews down the job until inspectors had okayed compaction. (Copies of this survey are available on request.)

This sort of costly delay can be avoided by alert contractors who use Nuclear-Chicago's d/M-Gauge for on-the-spot checking of moisture and density in sub-grades, embankments and base courses. This fast, accurate test method can pay for itself on a single job by letting contractors move ahead of inspectors—confident that compaction will meet specifications.

More than 500 of Nuclear-Chicago's reliable, portable d/M-Gauge systems are now in use by soil laboratories, state and federal highway authorities, engineers and contractors. Users report that accuracy is superior to slow, cumbersome, conventional methods. They like being able to get accurate, non-destructive measurement on a great variety of soils and materials. They like the immediate, in-field readings that pay off in time and dollars saved. It will pay you to get all the facts now from Nuclear-Chicago, pioneers in the application of the nuclear method to compaction control.

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## Editorial Comment

# Unbalanced Bids—Theory and Practice

*From a bulletin to member contractors by the Virginia Road Builders Association. While this discussion concerns the particular wording of specification clauses in Virginia, the points raised here are of interest in many states. The Editors.*

"What is an unbalanced bid?"

According to the Virginia Department of Highways, current specifications (Section 102.09) a bid is unbalanced "if the unit prices are obviously unbalanced either in excess or below reasonable cost analysis values. . . ." The right is reserved to disqualify the bidder and to reject his proposal if this condition prevails. This is the standard by which the Department may or may not determine that a bid is unbalanced. However, a look at some facts and a classic example would serve to indicate that this clause might well be eliminated from the specifications as impractical.

The term "reasonable cost analysis values" would indicate that the Department itself would make such an analysis and it does, in fact, make an estimate by which it determines whether the bids are *reasonable;* that is, not more than ten percent above the estimate.

No mention is made of those being under the estimate though the specifications are all-inclusive in the use of the phrase "either in excess or below reasonable costs. . . ." In the recent past, many bids have been more than 25 percent below the estimate and no effort has been made to invoke the unbalanced bid clause against the contractor submitting such a bid.

Apparently, the unbalanced bid clause is used only when the contractor finds a discrepancy in the plans and their agreement with local conditions. Though the highway department had far greater opportunity to study local conditions and to design the project in accordance with them, the Engineer feels no hesitancy in invoking this clause and penalizing the alert contractor for his discovery if he bids in the light of the information he has.

Perhaps one of the classic examples of ingenuity which could have been ruled to have unbalanced his bid was the proposal submitted by the Diamond Construction Company for the bridge (built some years ago) over the Mattaponi River at West Point. All of the superstructure sections of this bridge were built on the bank of the river, lifted by means of chain hoists and placed in a cradle on a scow, tied to the piers at high tide and allowed to settle on the bridge seats when the tide ebbed.

The contractor avoided the cost of falsework, of scaffolding for his workmen, of a floating rig for his concrete, and accomplished a considerable saving in labor since all of his concrete was poured from one location and required a minimum of handling in buggies or buckets before it was placed. His price was considerably affected by these savings—just how much is not known, for his cost records are not available. How much of the saving he passed on to the State is not known though we may safely assume that he had a greater profit than the other bidders who figured to use conventional methods requiring falsework, scaffolding, etc.

Such a bid, under the clause as written, could have been considered unbalanced if it were compared to the actual cost analysis of the work.

The contractor on this project did not ask the State to accept his bid on the basis of this method of operation, and, if it did not prove satisfactory, to pay him an additional sum for the use of the time-honored methods. No, the contractor offered to build the bridge, backed his idea with his own money and gave a performance bond to insure the completion of the project. The risk was all his and he was certainly entitled to any extra profit which could be made by underwriting that risk.

How much profit should a contractor make under these conditions? Our answer would be that his bid price is influenced by two factors: (1) his estimate of the cost of the work, including all ordinary and extraordinary risks and (2) his estimate of the competition which he expects to have. He is entitled to compensation for the risks underwritten, to a return on his invested funds, to a return on his own investment of time and knowledge on the particular project and a reasonable profit on the volume of work itself.

*Continued on page 71*

Glimpsing the hairpin grade on Berthoud Pass's western side. This pass road reaching elevation 11,314, was a tough location problem for two lanes, let alone adding a third.

Equipment hugged the inner ditch to permit two-lane traffic handling, important during the Colorado tourist season. The compressors include two Gardner-Denver SP900 Rota-Screw units in foreground, an Ingersoll-Rand Gyro-Flo 600 in background.

# Widening a High Mountain Pass Under Traffic

**Roads and Streets Staff Report**

The Colorado department of highways has completed grading for three-laning six miles of U.S. 40, from Berthoud Pass down the western slope of the Rockies. This spectacular project posed engineering, construction, and traffic handling difficulties seldom duplicated. To understand the problems which the engineers and contractor faced in providing structures, grading, and surfacing for this highway modernization requires an explanation of the working conditions.

U.S. 40 tops the scenic Berthoud Pass at 11,314 ft. elevation, 50 miles west of Denver. From this summit the highway twists and turns in a series of hairpin curves, with grades up to 6 percent, to its western foot at elevation 9,734 ft. The old two-lane roadway was literally a shelf, carved into the side of a heavily wooded mountain which falls steeply into the Fraser River. Complicate this terrain with a daily count of 2,000 to 3,000 cars and creeping trucks and the picture takes shape. Then, for good measure, throw in the daily occurrence of afternoon thunderstorms and a law which prohibits blasting at night. Further, the new road could deviate but little from the original alignment—the shelf could only be widened to convert from two lanes to three.

C. L. Hubner Construction Co., Denver contractor, bid this 6.2-mile project at $1,252,841. The major item was 585,000 cu. yd. of unclassified excavation at $1.00 per cu. yd. Of interest was 29,000 sq. yd. of precast concrete cribbing—Colorado's first experience with this construction. Notice to proceed was effective June 7, 1961, and completion was required by November 15.

The original specifications allowed the contractor to close the highway from 9:00 pm. to 9:00 am. The contractor was required to maintain two-way traffic the balance of the day. To fit into this schedule, an 8-hour shift started at 6:00 am. and worked to 2:30 pm. Normal procedure was for all blasting to be done at 6:00 am. to comply with the law prohibiting night blasting. Shovels and trucks then rushed in to clear the highway for the 9:00 am. pile-up of traffic.

Northwest 80D and Bucyrus-Erie 88-B shovels loading Euclids during the widening of the road shelf.

Lifter holes being drilled for shelfing into the mountainside. Gardner-Denver ATD3000 Swing Boom Air Trac drill in foreground, Gardner-Denver SP900 Rota-Screw compressor in rear—part of large modern equipment fleet assembled for this formidable project.

Immediately after 9:00 am. all rock hauling work was stopped for about one hour to allow accumulated traffic to pass through the construction zone. Throughout the rest of the day construction equipment fought a losing battle with tourist traffic. Numerous cars stalled in the high altitude. Many tourists were terror stricken by the precipitous drop to the river below. The contractor estimated that three hours' working time was lost each day because of traffic.

Beginning August 1, the contractor was permitted 14 hours of closure—from 11:00 pm. to 1:00 pm. This gave Hubner more daylight working hours but resulted in a great increase in traffic pile-up. Prominently displayed signs and bulletins published by the department of highways helped alleviate the situation. Many out-of-staters failed either to read or understand the signs, however. The result was a wonderful business for resorts at either end of the project. Cars started to pile up at about 8:00 am.

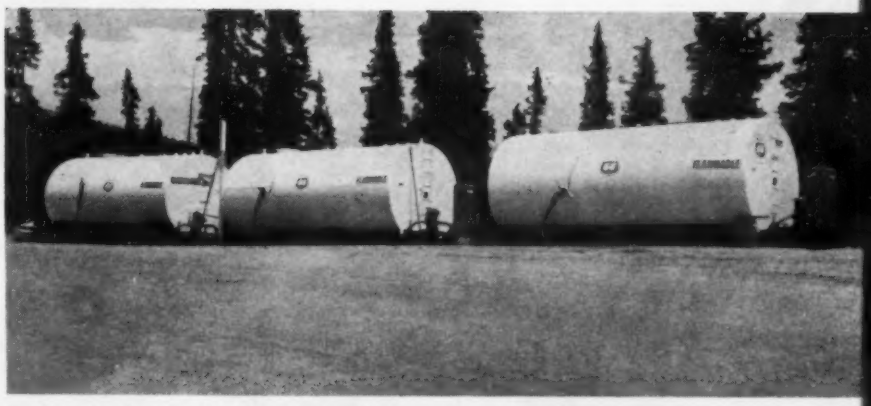
As a safety measure, numerous flagmen were used. The rule was to station flagmen wherever trucks loaded or dumped, at all points where trucks entered the highway, and at both ends of stretches wherever equipment restricted the traffic lanes.

The first work was for clearing the heavy timber along the right-of-way. Power saws cut the trees close to the ground. Merchantable timber was cut to log length, piled, and sold under the supervision of the U.S. Forest Service.

The general plan was to work from the top of the pass downward. Grading alternately involved heavy side-hill rock cuts, and fills placed on steep slopes. About 1,650 ft. of the fill was in the form of shelfing along slopes steep enough to require cribbing to hold it in place. Despite carefully planned engineering, a considerable amount of up-hill overhaul became necessary.

Drilling and Shooting. The procedure was to drill and shoot each shelf cut completely in one blasting operation. The steep mountain slopes and high altitude presented special drilling problems. In the first place, some of the slopes were so steep that it was impossible to get a crawler drill into position at

*Continued on page 74*



Fuel tanks for the Berthoud Pass job were located at the summit, and large capacity provided because of possible irregularity in tanker supply during the tourist traffic season.

Lifting device which expedited picking up and handling the precast concrete cribbing units.

Grinding rock bits with a Gardner-Denver G4 bit sharpener, mounted on rear of a G-D SP600 compressor.

Broadway Bridge in Los Angeles. Telephone cables supported by beams. Columns extended down to freeway grade. Utility lines in boxed enclosures are suspended from I-beams.

**Freeway Job Prescription:**

# Support Utilities in Place, Then Dig Underpass

**By Frank Randall**

Pacific Telephone and Telegraph Company,
Los Angeles, California

All of us are concerned in getting freeways, flood control and other jobs in the street or freeways completed without delays. Turning thoroughfares over to traffic as quickly as possible is one of our real problems.

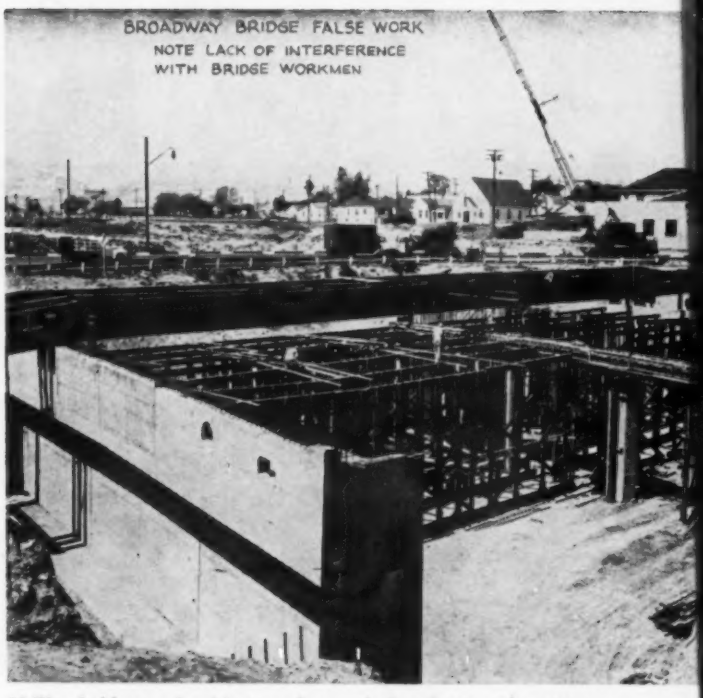
Much of the accelerated construction program is in urban areas, where freeways and flood control channels are excavated under existing surface streets. Vehicular traffic is routed to one side on a shoo-fly, or temporary bypass road, while a bridge is built. Then normal traffic over the conventional street is returned via the bridge.

These urban streets carry a vast amount of underground traffic too, in utility services. As cities grow, utility services increase and, in some instances, the routing of these vast facilities is an important factor in the time required to build the street, freeway or channel.

On a number of occasions during the past few years, we have tried supporting telephone cables in place during bridge construction. Use of this "support in place" method has resulted in substantial savings in time as well as money, men and material.

While nothing new has been added to engineering science, the use of this method as a

The hollow box bridge members were built on the ground, where the freeway will pass underneath. Part of the San Diego Freeway in the Los Angeles area.




Utility bridge and cable transfer work for these major structures was planned five years in advance.

planned and scheduled part of design is new. On these jobs, each agency has planned its part in complete coordination with the other parts. Some of the design took place five years ahead of construction and the support in place of cables was tried because it was thought to be a time saver. It was not born out of necessity or hardship or because there was no other way to do it.

On the various jobs, where new bridges were built, or old bridges torn out and extended in connection with freeways and flood control, from one to five telephone cables were involved. Support in place proved adaptable for everyone, public agency, contractor and utility.

A current job now under construction on the San Diego Freeway near the Los Angeles International Airport involves nine maximum size cables located on a city street in underground conduit. The freeway will be depressed about 30 ft., and will be six lanes divided, or about 300 ft. wide. One of the disturbing elements is some 600 pairs of highly sensitive circuits which are difficult and time consuming to cut around. The city street is one block from a major bridge crossing. Furthermore, an off ramp is to be located right where the communication cables are in their conduit. Complications were many, but the solution was well planned. A concrete "telephone bridge" was constructed on the ground in the form of a trough or "U". Piers for ultimate support were extended down to final freeway grade. The nine cables were picked up and moved about 30 ft. to rest inside the trough without splicing. Excavation for the freeway will proceed at will.

Time was not an essence in this job, as the utility bridge and cable transfer work was planned some five years in advance and the work done well in advance of the freeway excavation. But to be sure, there will be no contractor delay chargeable to this utility being in the way.

On a prior job involving 26 maximum cables, including transcontinental telephone facilities, delay would have been an important factor. In that case the cables were supported in place on a "T" structure, while the bridge falsework and lower portion of the bridge were built. When the bridge was poured up to the level of the cables, the cables were lowered a bit and transferred to their final resting place in the bridge. At no time did the cables interfere with workmen on the bridge.

Had these cables been transferred to the traffic shoo-fly road, at least six months' time would have been required to route the cables around the bridge construction. Another six months would be needed to transfer them back into the completed bridge.

way the day the bridge was completed and the shoo-fly closed to traffic. As we look at each of the elements and see what process can be eliminated or changed, old methods long forgotten are found to have uses in the new scheme of things. One of the real needs is for the design engineer in public works and the utility people to get together in the very inception of design. Advance planning pays.

## In New York: De Luxe Phone Cable Support

Another example of utility cable support during expressway construction is at the left. Bridge floor isn't for vehicles, or even pedestrians, but for trunk lines of the New York Telephone Company. The bridge spans the depressed Cross-Bronx Expressway just outside the tunnel under Grand Concourse. Johnson, Drake & Piper, the contractor, later protected the cut face under the bridge with timbering until the permanent retaining wall could be built.

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What the American city will be like within the next two decades was the theme presented in a series of papers at the annual convention of the American Society of Civil Engineers held at the Hotel Statler Hilton, New York City, October 16-20.

"Metropolis 1980" was the convention's general theme and 13 of the 14 technical divisions of the Society participated by sponsoring 39 sessions.


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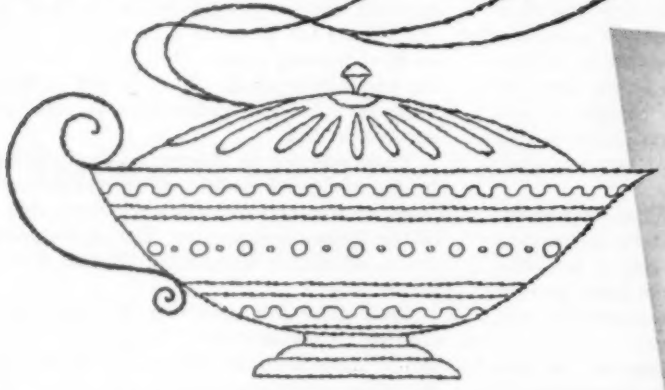

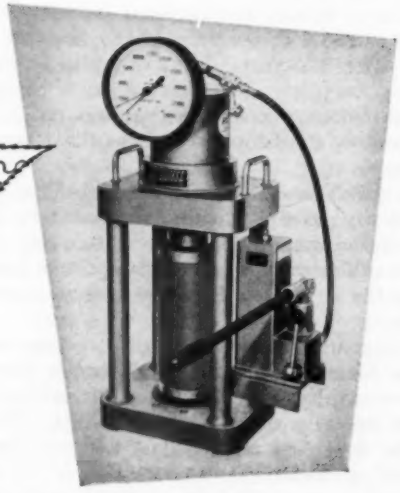

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Notice the new, distinctive GMC styling including lower hood with rounded edges for safer vision. New sparkling colors, inside and out. Triple-stitched upholstery increases seat life. Suspended pedals are easy to reach and operate. Instruments are redesigned for better reading, safer driving.

For 1962, you get new or improved profit-making advances in new GMC 105″ Conventionals, from ½-ton pickups to the big 60,000 lbs. GCW six-wheelers.

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. . . all yours with GMC Steel Tilt-cabs. Full 55 degree tilt completely uncovers the engine and all accessories, but controls remain in perfect alignment on rigid stationary island. You get short turns and easy handling. Bonus loads are yours, too, with front axle set-back 52″ for maximum rated capacity, short 72″ BBC and wheelbases as short as 98″.

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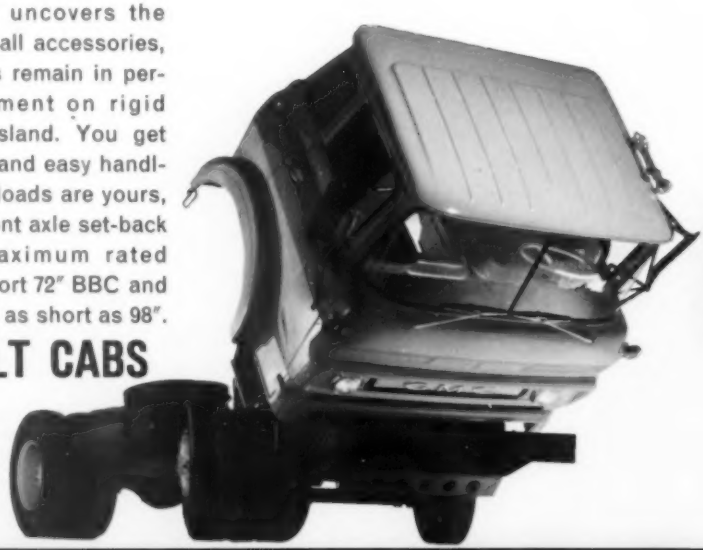

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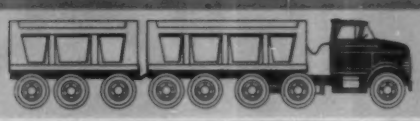

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## 90" CONVENTIONALS

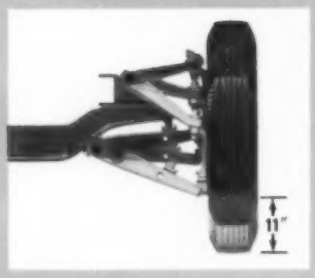
## LOW-COST SIX-WHEELERS WITH BUILT-IN STAMINA THROUGHOUT!

This new GMC W5008 six-wheeler saves you money when you buy and as you own. Here's why: (1) Buying price is surprisingly low, (2) You get the exclusive, bonus-life V-6 engine, 351 cu. in. or optional 401 cu. in. (3) Suspensions are improved for easy riding and continuous high axle loadings, (4) Low ground to cab floor height for easy in and out, (5) Plus many more built-in durability and dollar-saving bonuses.

## 105" CONVENTIONALS

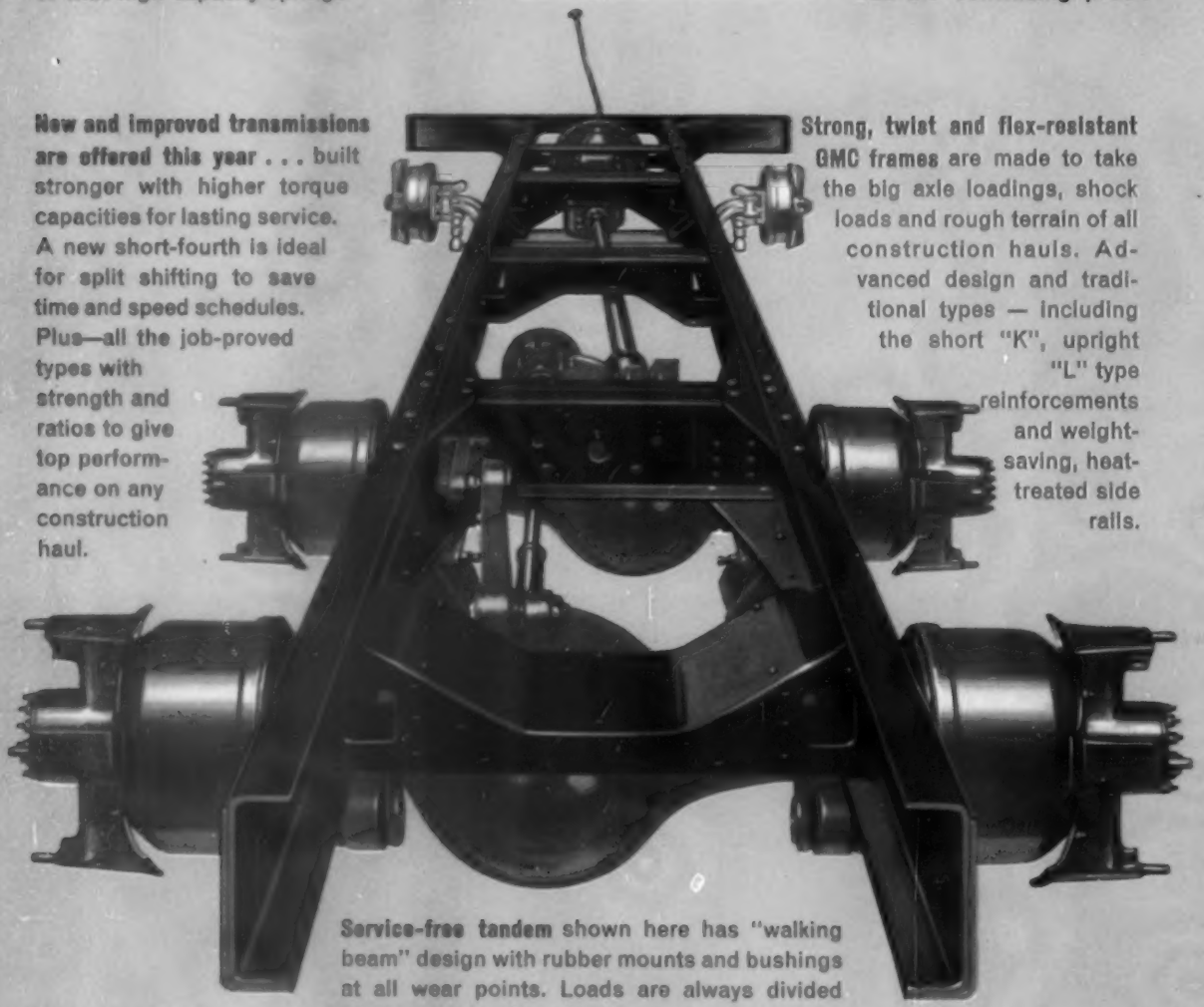
# BUILT-IN BONUSES MAKE 1962 G

**Improved suspension.** New, low deflection rate springs and shock absorbers are standard on wide-tread, I-beam front axles. You get good cushioning, great stability and short turning. Also available: higher-capacity front axles with these easy-ride springs, or with high-capacity springs.



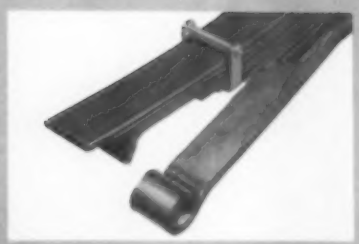

**Smooth out bumps up to 11" high** with GMC's independent front suspension. Wheel fight is eliminated. Handling is easier and safer. Riding is smoother, nearly like a passenger car. One ride will give you all the convincing proof.

**New and improved transmissions are offered this year . . .** built stronger with higher torque capacities for lasting service. A new short-fourth is ideal for split shifting to save time and speed schedules. Plus—all the job-proved types with strength and ratios to give top performance on any construction haul.



Strong, twist and flex-resistant GMC frames are made to take the big axle loadings, shock loads and rough terrain of all construction hauls. Advanced design and traditional types — including the short "K", upright "L" type reinforcements and weight-saving, heat-treated side rails.

**Service-free tandem** shown here has "walking beam" design with rubber mounts and bushings at all wear points. Loads are always divided 50-50 on each axle and axles are always in proper alignment for increased tire and axle life.



**Long-life, easy-ride vari-rate rear springs** are standard on four-wheel models. Springs only support the load. Braking and torque reactions are transmitted to the frame by the built-in torque leaf. Springs are free at both ends, ride on cams that automatically adjust the springs to the loads.

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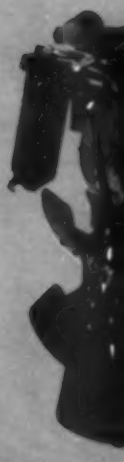

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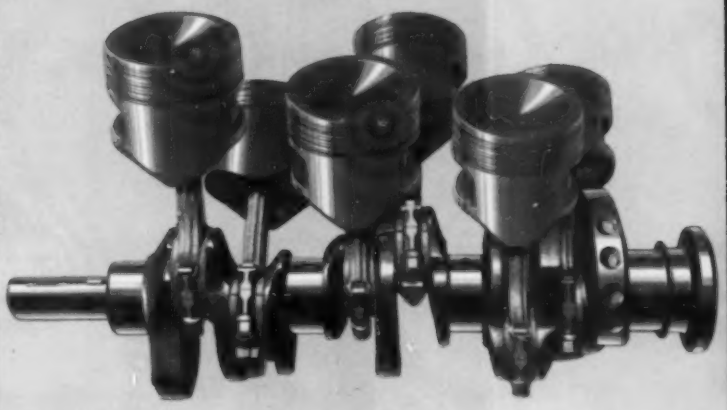
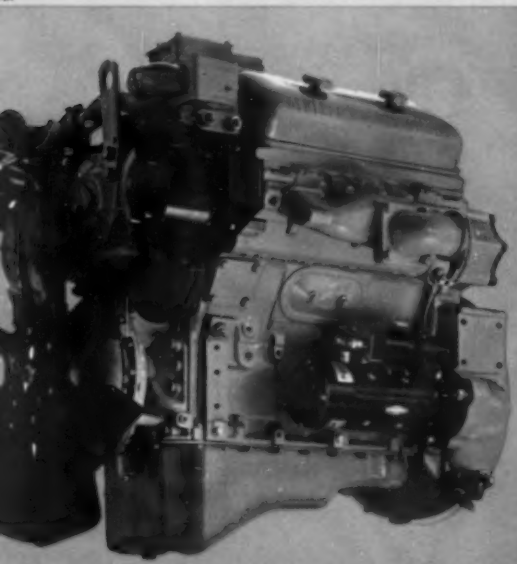
● Piston travel is up to 26% less than comparable engines. Saves thousands of engine rpms every mile to reduce gas bills and service costs. GMC-built aluminum pistons have cast-in steel expansion band, chrome-faced top ring, big 1.24" diameter piston pin that's case-hardened and everything for lasting operation and proper oil control.



● Every GMC connecting rod is checked and inspected 9 ways to guarantee exacting dimensions and weight . . . to assure you extra bonus life.

● V-6 crankshafts are twice as husky as comparable V-8s . . . tougher, stronger to last longer. Bearing areas are up to 60% greater than comparable engines for thousands of extra trouble-free miles.



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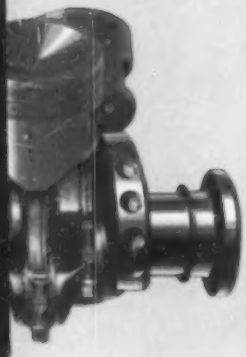
meter piston pin
for lasting oper-



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## COOLER RUNNING... NEEDS LESS CARE

**Valves are made to last** with short, stiff stems—sodium-filled on 351 and 401 exhaust valves—for better heat dissipation and added life. Big diameter valves permit freer breathing for top efficiency. Integral valve guides reduce stem exposure to hot gases and assure faster heat transfer.

**Most effective method of prolonging valve life** is GMC rotators. Positive, self-cleaning action prevents premature failures. Optional on 305D, standard on all others.

**Concentrated, damaging "hot spots" are eliminated** with up to 167 gallons of coolant circulating every minute and with up to 33% more cooling surface than other engines. Coolant temperature varies less than 4 degrees throughout the entire engine. More proof that GMC engines are built to last longer.

**Exhaust valve seat inserts,** standard in 351 and 401 engines, are made of hard nickel-chromium-tungsten-cobalt alloy steel to withstand the intense heat and wear.

TEAR OUT AND SAVE

WER

NCH

er cost, up to 530
horter than com-
eration, smoother
with GMC's two-
every down-
s. And there
s your GMC

--218 @ 2100

| ENGINE MODEL | MAX. TORQUE RANGE | MAX. HORSE-POWER | TRUCK SERIES |
|---|---|---|---|
| 702 | 625-630 @ 1400-2100 | 275 @ 2400 | B & L7000 BW & LW7000 |

## MOST LOAD-MOVING POWER YOU CAN GET! EXCLUSIVE, BONUS-LIFE TWIN-SIX

This is the only standard gas engine that gives you 275 hp. performance . . . the power needed to get the big loads rolling without laboring the engine or driveline . . . the power to keep rolling with up to 60% less shifting than trucks with other gas engines. And this is low-stress, easy-stroking power, as you can see on the chart. Results: amazing fuel economy and greatly increased engine life.

# "Let's Do the Job - Right"— Denver AASHO Meeting Theme

By Harold J. McKeever
Editor-in-chief

"Let's complete the highway program on time—but let's do it right."

In these words Federal Highway Administrator Rex Whitton, in effect, keynoted the 47th convention of the American Association of State Highway Officials, held at Denver, October 9-13. Whitton went on: "In the final analysis, the measure of our accomplishment in the greatly expanded highway program will be the quality of our work as well as the rate at which we do it."

These remarks by Whitton came just after two opening-session speakers had pulled no punches in reviewing the (proved or suspected) shoddy construction, kickbacks, inspector buy-offs and right-of-way graft in some of the highway departments. Delegates who packed the first-day general sessions at Denver also heard much to be proud of. But whether the delegates liked it or not, Monday was literally "wash day". Congressman Scherer of Ohio and L. J. Andolsek representing Congressman Blatnik of investigative committee fame left the audience with the realization that—whatever the extent of substandard work and dishonesty that may eventually be proved—the inquisition is far from over.

On the happier side, the first-day speakers reviewed some of the year's accomplishments. Items:

1. The Interstate system progress is impressive—11,230 miles open to traffic (counting turnpikes and ready-built free roads), 4,700 miles more under construction, 9,950 miles in the design stage, in the first five years. ABC roads, too, tally impressively with 119,000 miles of projects completed since 1956. This from Rex Whitton's talk.

2. Great strides have been made in adopting electronic computer methods, said AASHO's retiring president, D. H. Bray, of Kentucky, who noted that 47 states have taken on the new methods.

3. It was a noteworthy year in tightening control over decisions and field procedures affecting quality of construction. Bray said that the AASHO Information Guide to Project Procedures issued in 1960, has expedited this effort (but not uniformly; see further details).

4. Other AASHO accomplishments of the past year listed by Bray include publishing of the Manual on Uniform Traffic Control Devices, issuance of new publications on materials and on small bridges, and wind up work on the AASHO Road Test project in Illinois.

Also spotlighted during the general sessions were some top-level problems and developments:

1. The growing urbanization of America and the urban part of the highway job were emphasized by president Bray, who lists among the urgent questions the role of urban transit and possible diversion of highway funds for mass transit; housing in connection with urban highway projects; and the possibility of a federal-city relationship emerging that would by-pass the state highway department in administering urban freeway matters.

2. Right-of-way acquisition procedures, which vary widely in the states (and under suspicion in some), are to be combed over in a 2½-year study just launched. Congressman Clifford Davis (D-Tenn.), member of the House Public Works Committee and Roads Subcommittee, said this study will review state practices covering real property acquisition for all kinds of federal-aid projects, highways being the largest category. This study is expected to help correct existing inequities in right-of-way procedures.

3. The threat of encroachment on the Highway Trust Fund, now set up for the Interstate program, was told by two speakers. Senator Pat McNamara (D-Mich.) voiced this warning. And Congressman George H. Fallon (D-Md.) chairman, House Subcommittee on Roads, said attempts to chisel in are sure to be tried;

*Continued on page 71*

# Special Grease Eased Jacking of Huge Pipe Jacking Job

## Deep open trench obviated by jacking 1200 feet of 10 foot-diameter concrete pipe

A pipe jacking operation which set a record for length for driving large concrete pipe from one heading was accomplished during 1960 in National City, California. Johnson Western Constructors, of San Pedro, successfully jacked 1,200 lin. ft. of 120-in. ID concrete pipe at a 75-ft. depth for a storm drain job.

Of interest in highway planning as well as municipal drain circles, this project utilized a unique detail credited with making the job possible: lubrication of the pipe exterior. This was done with a specially compounded drilling material called Keneze. The material was designed for minimum absorption in the soil and for maintained viscosity and lubricating qualities under varying pressures. Its ingredients: bentonite, water, crude oil, and a jelling agent developed by Ken Corporation.

The jacking was done by means of: (1) A boring machine in front of the first pipe section; (2) Four intermediate jacking stations inside the pipe (total jacking capacity of the system, 3,800 tons); (3) An accurate steering system for lead pipe sections involved.

The storm drain job, part of an area master plan, will be completed in 1961. The job also includes 3,250 ft. of 120-in. pipe in all.

Originally the specifications for the 1,200-ft. section called for open trench installation, using either precast pipe or monolithic construction. However, it was found that Johnson Western's alternate jacking method was considerably cheaper (total cost: $375,000) and offered several advantages over open trench installation.

One disadvantage of an open cut was that the invert depth would have been 75 ft. A trench this deep meant extensive shoring; yet the right-of-way was only 100 ft. wide, leaving very little room to maneuver equipment.

Soil conditions also favored jacking. The ground varied from hard, dry clay to a cemented sand, gravel and cobble formation that was almost a conglomerate. There were some loose, sandy pockets, but no running or squeezing ground. No hard rock or ground water was encountered.

The jacking method had one other cost advantage. Jacked pipe requires less reinforcing steel than pipe installed in an open trench. The reason is that the bearing load on the pipe is less because the overburden is almost completely undisturbed.

The first step in the operation was the excavation of a jacking pit large enough to hold the main jacks and to provide room for installation of the pipe sections. A 50-ton American stiffleg derrick was set up beside the pit to handle the pipe and to perform other lifting chores.

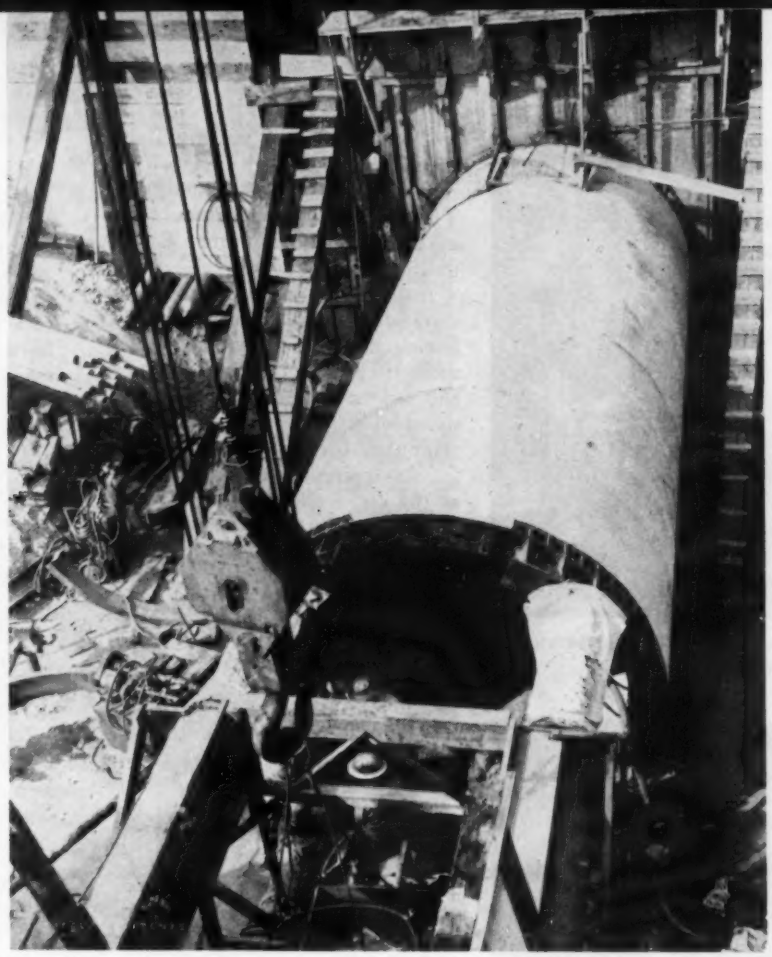
### How Lubricant Applied

Primary injection of the Ken lubricant was made at the lead cutting edge of the pipe by a system of pumps and pipe manifolding. A thin coating was also applied as the pipe entered the tunnel from the jacking pit.

The second main point of lubrication was about 65 ft. from the main jacking pit, where a 36 in. diameter hole was drilled directly over the pipe to serve as a lubricant reservoir. Lubricant was also pumped directly from the inside to the outside of the pipe through a series of inserts installed at regular intervals along the pipe.

In the jacking pit were four 250-ton jacks, each with a 13½-ft. stroke. Designed by Johnson Western and built by Hydraulic Press and Engineering Company, the jacks were powered by a Logemann Bros. two-stage hydraulic pump with a working pressure of 1,800 psi.

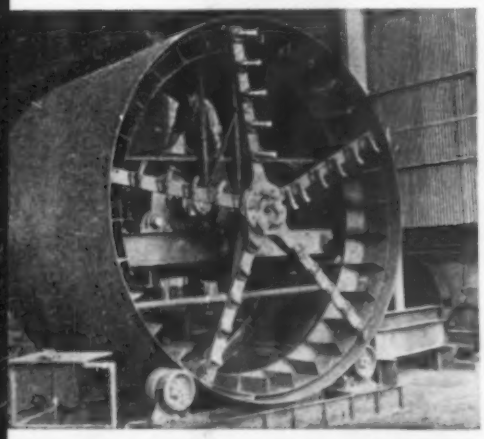
The jacks were supported on a steel frame and reacted against 27-in. WF beams bearing against vertical 12 x 12 timbers. Further support was provided by grouting the ground behind the timbers.



Concrete pipe in position prior to start of jacking.

(Below): Just-excavated jacking pit. To the right are sections of the 120-in. pipe used.

Drums of special Keneze lubricant used on outside of pipe.



Boring machine, shown in the factory, was fastened to leading pipe section and cut hole slightly larger than pipe diameter.

Starting point for the tunnel boring operation.

The jacking load was distributed to the pipe through a fabricated steel ring of ¾-in. welded plate. The ring was faced with old conveyor belting to minimize damage to the pipe.

Instead of forcing the pipe through original ground, a rotary boring machine was used to chew away the soil at the leading end of the pipe string. The machine consisted of a rotating ring with five arms that carried hard-faced teeth in a staggered pattern. The teeth at the outer edge could be turned slightly outward so that the resulting bore was bigger than the outside diameter of the pipe.

In addition a steel cutting edge was rigidly attached to the first pipe section. It, too, was slightly larger than the pipe, so that it left an annular space of ⅜ to ½ in. around the pipe. The space insured free passage of the pipe and provided space for the lubricant.

A 20-hp Ingersoll-Rand air motor powered the boring machine. The motor operated through a flexible coupling, variable speed reducer, and chain drive. The cutting head was capable of 6 rpm under load.

The machine had a horizontal travel of 20 in. When it reached its full travel, the cutter head was retracted, and the pipe was jacked ahead so the machine could take another bite.

Excavated material fell into vanes behind the cutting head. As the machine rotated, the vanes carried the cuttings to the top of the pipe and dumped them onto a conveyor belt that carried them to a hopper 12 ft. behind the face of the tunnel.

The hopper had hydraulic gates that fed the material into a battery-driven rubber-tired muck car. The car had a removable skip that could be hoisted out of the jacking pit.

The two-yard muck car was large enough to permit continuous operation of the boring machine for the first 900 ft. For the final 300 ft. progress was periodically delayed because the car could not get back and forth fast enough to empty the hopper.

To supplement the 1,000-ton jacking force at the main station, four intermediate jacking stations were installed. Three of the stations mounted four 200-ton jacks each; the fourth had two 200-ton jacks.

To make an intermediate station, a pipe section was specially fabricated to carry a 5-ft.-long steel sleeve. The sleeve slipped over the pipe in a ⅜-in. recess in the outer surface of the pipe. It was welded to a 3x3x¼ in. angle that had been bolted flush into the outside of the spigot of the section ahead of it.

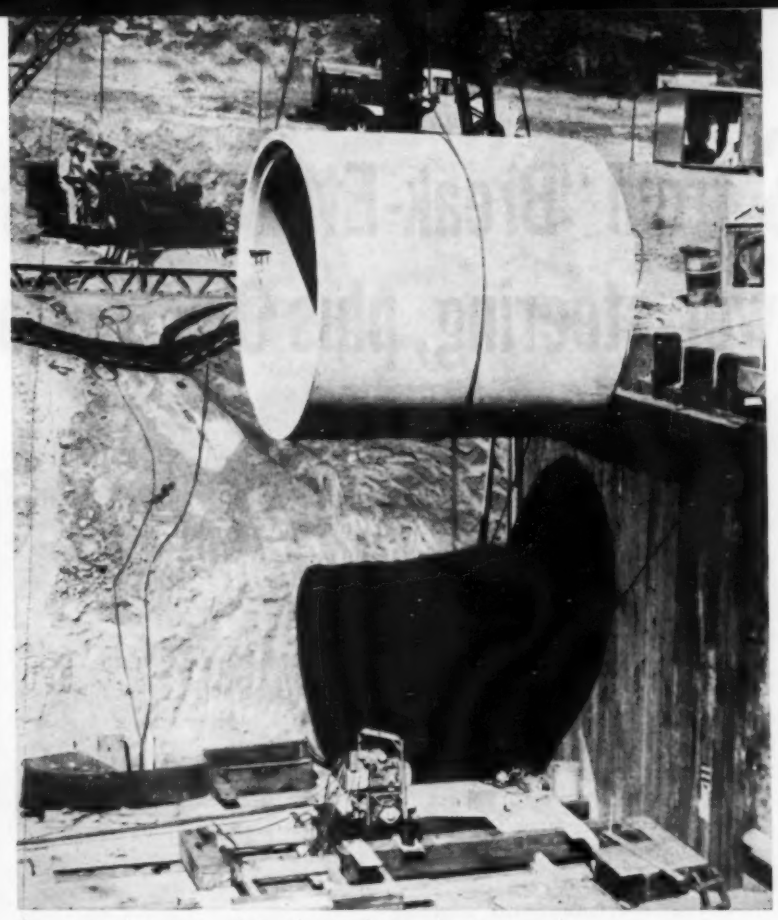
The pipe section with the sleeve and the section ahead of it held the jack supports. When there two sections were installed at the main pit, they were held apart at the joint by a 10x3½-in. circular channel. Then the main jacks pushed the pipe into the hole.

To install the intermediate jacking station, the crew burned out the channel that separated the two pipe sections. In its place, they inserted fabricated steel rings with segments bearing against the pipe joint faces. The rings carried the jacks.

The intermediate jacks had a 48-in. stroke. As they opened up the joint between the pipe sections, the opening was protected from sloughing ground by the external steel sleeve. Rodgers jacks and the hydraulic pumps were used. All four intermediate jacking stations were controlled from a central point by one operator.

The boring machine operator maintained telephone contact with the operator of the intermediate jacking stations. When the boring machine reached the end of its travel, its operator gave the order to move. The jack station operator pushed the leading string of pipe sections ahead with the forward jacking station until the boring machine operator gave the signal to stop. Then, by selective valves and signal lights, the jacking operator shoved forward each successive string of pipe, the entire string moving forward in an earthworm-like fashion until the final gap was closed.

The lead pipe progressed about 5 ft. each 8-hour shift in a schedule of three shifts per day, seven days a week. Continuous operation was necessary because the pipe had a tendency to bind if left stationary for any length of time.



Concrete pipe section being lowered into the jacking pit.

The movement had to be stopped for as much as an hour to install each new section of pipe, and even longer to install an intermediate jacking station. During the three months it took to complete the job there were three major shutdowns for equipment adjustment.

The pipe itself was manufactured specially for jacking by the American Pipe and Construction Company in its San Diego plant. Each section of 120-in. ID pipe was 12 ft. long and had 11-in. walls. To make the pipe smoother for jacking, the bell end was cast in a steel form, and the spigot end was hand finished.

A ring of asbestos insulating material was inserted inside the bell of each joint to prevent damage during jacking. This material (Johns-Manville Marinite) had the compressive strength and resiliency needed to take up irregularities in the concrete surfaces while under the 1,200-psi pressure exerted on the pipe.

Accurate steering devices were essential in this jacking operation because of the extreme length of the pipe involved. Johnson Western used four 6-in. channels to tie the first four pipe sections together in an integral unit. These channels were bolted to the trailing edge of the first section and to the leading edge of the fourth section.

Each channel could be tightened or loosened by 1-in. high-tensile bolts at the trailing edge. Strain gages mounted on the channels accurately measured any change in tension. Early experience quickly showed the amount of strain change needed to produce a given change in pipe direction, and the result was an unusual accuracy in the final location of the pipe.

The jacking project was conceived and supervised by L. J. Sullivan, president, and R. B. Zinser, vice president and chief engineer, of Johnson Western Constructors. W. J. Parks was project engineer, and A. C. Hill was superintendent for Johnson Western. Wayne P. Lill is the engineer on the job for National City.

## ASCE Achievement Award

The American Society of Civil Engineers again plans a national competition to select the Outstanding Civil Engineering Achievement of the Year for the 1962 Award. As announced by W. H. Wisely, Executive Secretary, it will be the third annual competition to name the outstanding civil engineering project. The first award, for 1960, was won by the St. Lawrence Power and Seaway Project, and the second, or 1961 award went to New York International Airport.

Judging of the projects, which are nominated by the Society's directors, is based on engineering skill, engineering progress and service to mankind. Eleven projects were nominated for the 1961 competition.

The jury of editors selected to name the 1962 award: Robert E. Fischer, Architectural Record; Waldo G. Bowman, Engineering News Record; John M. Server, Jr., Southwest Builder and Contractor; R. G. Zilly, Consulting Engineer; R. E. Fuhrman, Journal of Water Pollution Control Federation; Harold J. McKeever, Roads and Streets; James I. Ballard, Western Construction, and Hal W. Hunt, Civil Engineering. The winning project, according to the rules, must have the endorsement of the Society's Board of Direction.

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## Cumulative Index to ASCE Publications

RECENT PUBLICATIONS of the American Society of Civil Engineers are listed in a new index that gives, by title and author: articles appearing in *Civil Engineering* from the first issue, October 1930, through December 1959; papers in *Transactions* from 1935 (cut-off date of an earlier index) through 1959; and *Proceedings* from 1950 through 1959 (many of the Proceedings papers do not appear in Transactions). Most items are listed under more than one heading for ease in finding. Available from the American Society of Civil Engineers, United Engineering Center, 345 East 47th Street, New York 17, N.Y. Hard bound in blue cloth, 816 pages, 6 x 9 in. Price $20, with 50 percent discount to public and school libraries.

# GRAB JOBS from "Break-Even" Bidders . . .

## "Live-Track" power-steering, plus On-the-Go

**To make a turn,** you simply change the speed of a TD-25 track with "live track" Planet Power-steering. This way, you keep full power and traction on both tracks to assure full-load turning. Load-limiting "dead-track drag" doesn't sabotage your bids.

**To handle big offset loads,** or to counteract the side draft of benching without sluing or "bank-nosing," simply shift the TD-25's load-side track to high range; leave the other track in low. You stay on course, deliver full loads or make full cuts, full time.

**To keep full loads on the move,** full time, through tough or easy going, use instant-acting, on-the-go Hi-Lo, power-shifting. Cut-to-fill matching of power to condition goes far to prevent payload spillage. Fast, easy TD-25 power-shifting is a built-in bonus of Planet Power-steering!

**For constant-contact push-loading,** apply full TD-25 power with planetary track control, get full speed and production without scraper-mauling impact. Prevent push-block banging damage.

**Prove to yourself how turning affects earning.** See how TD-25 advantages let you grab jobs from "break-even" bidders and still make profits. Let your International Construction Equipment Distributor demonstrate!

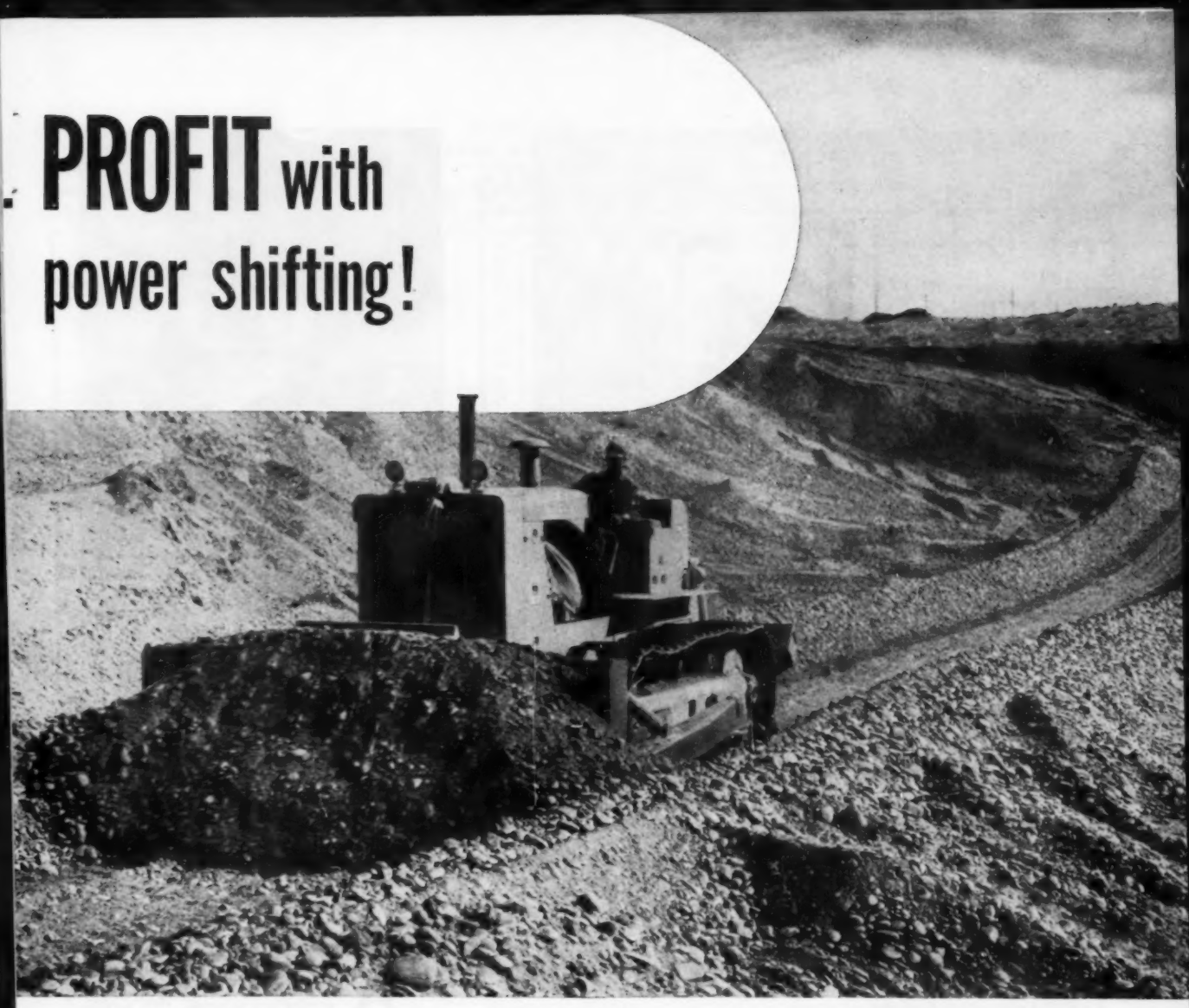
*International*® *Construction Equipment*

International Harvester Co.,
180 North Michigan Ave., Chicago 1, Illinois
A COMPLETE POWER PACKAGE

**"On course" steering with offset loads** means full-capacity production even in rock-laden material. To prevent needless zig-zagging and loss of momentum, a "25" operator simply changes the speed of one track to put extra power leverage where needed to meet changing conditions. These two machines, pioneering a 107-foot deep cut, are members of a fleet of seven International TD-25's on a Kentucky Turnpike job in rocky, hilly terrain.

**Pushes of over 600 feet pay off** for this New Mexico contractor—producing sub-base gravel for a North Albuquerque highway. Instant speed control of either or both tracks with the planetary transmission means positive load-control—to heap "ripped" gravel and "run" to the crusher hopper. Then the "25's" high reverse of 7.5 mph means fast back-up for the next push. What would have been a costly 2-tractor operation is efficiently done *with one TD-25!*

# PROFIT with power shifting!



**Steady full-power traction on both tracks** full time assures ample push to beat the grade and handle big loads of tractor-ripped bentonite at an Arizona mine. This TD-25 keeps busy removing overburden, ripping and stockpiling the ore. Only the "25" gives you the power-wallop of the free-breathing, dual-valved DT-817 diesel—with 230 turbocharged hp. Push-button direct starting saves operating time—operator effort!

**Planetary track speed control** lets you turn heavy offset loads or push straight ahead with them—without profit-robbing spillage or time waste. See how this planet-drive "25" beats king-sized clutch-steered crawler capacity with 2-finger ease—overcoming the sidedraft of bulldozing random-dumped dirt and boulders on a Virginia road job. And right where clutch-steered king-sized crawlers waste power and momentum, TD-25's can heap-load scrapers in record time!

## YOU EARN WITH WHAT YOU CAN TURN WITH!

. . . for more details circle 301 on enclosed return postal card

A core drilling machine taking a record sample from the edge of a pavement constructed under the current road program of the Colorado Department of Highways. Photo taken for Roads and Streets, August, 1961, during coring on the Kremmling-Parshall highway.

**By W. J. Walsh**
Staff Construction Engineer,
Colorado Department of Highways

# Inspection After the Project is Done

About midway of the 1960 construction season, the Colorado Department of Highways adopted a procedure for post-construction inspections of completed projects. No attempt is being made to apply this procedure to all projects, but certain projects are selected at random. An attempt is made to make these selections as representative as possible over various types of projects; such as, concrete pavements, bituminous pavements, plains and mountains. No attempt is made to give the work a numerical rating, but rather to make measurements of pavement widths and thickness to take samples of the materials for testing in the central laboratory. The inspection is purely fact finding.

A three-man inspection team is appointed for each project selected. This team consists of a representative of the Staff Construction Division, a key man from a neutral district—such as a District Construc-

Sheet No. 1 of 1

F 017-3 (8)
Length: 4.541 Miles
Kit Carson - West

Morris
Kilpatrick
McEldowney
Kreiling

Roger More
Arden Powell
} Core Drill

| Date | Description | Overall Width Plan | Overall Width Meas. | Roadway Width Plan | Roadway Width Meas. | Plant Mix Surfacing Thickness Plan | Plant Mix Surfacing Thickness Meas. | Prime Depth | Cement Treat Base course Thickness Plan | Cement Treat Base course Thickness Meas. | Subbase Thickness Plan | Subbase Thickness Meas. | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6/6/61 | Gardner Avenue @ Sta. 3239 | | | | | 3" | 2¾" | ½" | 4" | 4" | 6" | 6¼" | Subbase placed in 2" layers over Project |
| " | Gardner Avenue East bound | | | | | 3" | 2¾" | | | | | | |
| " | Gardner Avenue West bound | | | | | 3" | 3" | | | | | | |
| " | Station 3239+ ℄ on Curve | | | | | 3" | 3¼" | ½" | 4" | 6¾" | 6" | 6¾" | |
| " | " " " Top Mat | | | | | 1" | 1¼" | | | | | | |
| " | Station 3177+ 6½' Lt. of ℄ | | | | | 3" | 3¼" | ½" | 4" | 5¾" | 7" | 8½" | |
| " | " " " Top Mat | | | | | 1" | 1" | | | | | | |
| " | Station 3127 6½' Rt. of ℄ | | | | | 3" | 3¼" | ½" | 4" | 4¼" | 7" | 9½" | |
| " | " " " Top Mat | | | | | 1" | 1" | | | | | | |
| " | Station 3324+ Curb width E.B. | 77' | 428 | | | | | | | | | | |
| " | " " " W.B. | | 326 | | | | | | | | | | |
| " | Station 3308+ Bridge WE to WE W.B. | | 3525 | | | | | | | | | | Reflection cracks in Pavement (wire mesh) |
| " | " " " Island " | 82' | 1165' | | | | | | | | | | |
| " | " " " WE to WE E.B. | | 3535' | | | | | | | | | | Flex forms on curbs |
| " | " " " Walk | 5' | 50' | | | | | | | | | | |
| " | Station 3232+ West bound lane | | 364' | | | | | | | | | | Rock imported 25% for top mat. |
| " | " " Island | 98' | 251' | | | | | | | | | | |
| " | " " East bound lane | | 382' | | | | | | | | | | |
| " | Station 3124+ | 46' | 439' | 24' | 24' | | | | | | | | |
| " | " 3145+ | 44' | 44' | 24' | 24' | | | | | | | | |
| " | " 3151+ | 44' | 426' | 24' | 24' | | | | | | | | |
| " | " 3161+ | 44' | 426' | 24' | 24' | | | | | | | | |
| " | " 3206+ | 44' | 44' | 24' | 24' | | | | | | | | |
| " | " 3245+ | 46' | 44' | 24' | 24' | | | | | | | | |
| " | " 3278+ | 44' | 44' | 24' | 246' | | | | | | | | |
| 10/6/61 | " 3452+ | | | | | | | | | | | | Roadway approach was revised See W.O. #13568 |

One of several types of data sheets compiled for a project, this one is concerned with proof of adequate or specification depth and width of the various pavement components.

tion Engineer or District Materials Engineer—and a key man from the district in which the inspection is being made. The Resident Engineer or Project Engineer who is in charge of the work during construction is invited to accompany the team. However, he takes no part in the inspection or the writing of the report. He is there to observe and to supply information to the team relative to job details; or he may comment on certain features of the job which may be of interest or help to the team.

A representative of the BPR is invited to accompany the team, but he is solely an observer and takes no part in the inspection or writing of the report.

One of the objectives is to make our engineers feel that their work is being examined by others in the department who have a mutual interest, with no thought of fault finding, but simply to come up with the facts. There may be some slight deviation in pavement width or depth of base courses or wearing course. We have all the same problems and all are subject to the same human errors. Mistakes will creep in, and when these are found, the object is to point them out—in order to avoid recurrence on future work. We have not yet found a job entirely free from fault, nor do we ever expect to, but we intend to keep on trying to build as near perfection as possible or feasible.

We feel that these inspections are good. They not only bring to light some minor shortcomings of construction, but they may also point up some design and specification features which could be improved on. In the future we are going to include on the team a man from the Roadway and Plans Division—preferably one who worked on the plan preparation for the project under inspection.

Following the inspection and checking of a given highway job, report sheets are turned in to headquarters. In addition to the sheet reproduced herewith, showing widths and core depth checks, other forms are used routinely. One is for reporting the actual gradation breakdown found for the subbase and/or select borrow material, in relation to the specified gradation. Another serves to record essential data for the asphaltic mix, including moisture, aggregate content, and analysis for the material from each pavement layer.

The transmission of such data through two stages upward through the administrative personnel of the Colorado Department of Highways, is also deemed of interest. This is not done in "quickie" fashion, but in sufficient detail to insure an adequate review of the project. The data from Project W 017 (8) (see accompanying core sheet), were summarized from the field in the following letter to W. J. Walsh,

staff construction engineer:

Report to Mr. W. J Walsh
Harris-Kilpatrick-McEldowney-Kreiling
Post Construction Inspection

A review of the contruction of this project was made October 10, 1960. Samples were taken of the subbase material, the cement treated base course and the plant mixed asphaltic surfacing. Measurements of depths and widths of the various materials were made.

The design of the subbase Class (2) was on curve D requiring 6 and 10 inch thickness; but due to the variance of the slopes of the top and bottom subbase material, the total design thickness existed only at the shoulders of the roadway. The thicknesses measured were all greater than plans required—our measurements could have been of some unclassified excavation borne out by the composite sample #24535 of subbase material showing excess fines and P.I. The field tests show there was a struggle to keep the 200 sieve material within specification (19 of the 75 tests made exceeded the 12% maximum). However, the Central Laboratory did recommend for acceptance a representative sample $47765 with 14%passing the 200 and 4.5 P.I.

The base course surfacing was cement treated and appeared to be excellently blended. The special provision required mixing in a plant. Check sample #24534 proved acceptable specification material.

Asphaltic surfacing was of two layers, top 1 inch—bottom 2 inches. Special provision required the importation of rock for the top layer and approximately 25% was used. This addition well pleased the District forces, and it should be noted the following estimate to bid relation on the two items.

Bottom course

| PMAS | Estimate | Bid |
|---|---|---|
| | $3.00/ton | $2.80/ton |

Top course

| | | |
|---|---|---|
| PMAS | $6.00/ton | $4.00/ton |

In town it was Mr. Harris's and my opinion the turn, keep right and various warning signs were too numerous. Also, at bridge approaches the District has placed three or four at fifty to one hundred foot intervals on each corner of the bridge 4 inch steel beams protruding 24 to 30 inches above ground. The reaction of Mr. Harris and myself was that these may prove more of a hazard than a benefit to the public.

At the intersection of highway station 3332, some adjustment will have to be made in the median island. Long semi-truck-trailers are running over the north end of the island as they make the turn. Also all curb and gutter left station 3291-3295 could have been eliminated in favor of valley gutter. The customers of the motel, cafe, filling station and curio store disregard the constructed entrances—two entrances are shown on the plans.

J. S. Kreiling

Then, in turn, Mr. Walsh communicated on this project to C. E. Shumate, assistant chief engineer, his letter also being reproduced here in full:

To: Mr. C. E. Shumate
From: W. J. Walsh
Post Construction Inspection

Submitted herewith is the post construction inspection report as compiled by the team assigned to the captioned project.

All measurements are within tolerable limits of plan requirements. However, we are hardly elated to find the test result on one sample of surface showing 21 percent passing the 200 sieve with a P.I. of 7.3. The report suggests that this may have been contaminated with some unclassified material from the subgrade. This points up the necessity for extreme care when lifting the sample. Perhaps we should leave a small portion of the material on the subgrade when lifting the sample, after which the depth could be measured.

The reference to 4 inch steel beams protruding 24 to 30 inches above ground is significant. We presume these supplement the standard guard post extending from the end of the bridge. This being a departure from standard practice, some review of the situation might be in order to determine if the team comments relative to these being a hazard is valid.

Worthy of note are the comments by the team regarding numerous warning signs within the town limits. This should be reviewed as signing is sometimes overdone. Other remarks by the team may appear to be critical of certain design features. Such criticism is not intended to be fault-finding but is offered in a constructive spirit. It is entirely possible that the team's judgment may be wrong, but certainly these things should be laid out in the open as this opens up another avenue of thought leading to improved methods.

In addition to those indicated below, ten copies of the report are attached for such further distribution as you care to make.

## Publicity Launched for 1963 Road Show

The Construction Industry Manufacturers Association has expanded the Publicity Committee of the 1963 Construction Equipment Exposition and Road Show to take advantage of the ability of Duane Cronk of the Highway Information Service of Washington, D.C. Cronk, who is editor of the Roads and Streets Newsletter and Washington editor for this publication is nationally known in the highway industry.

Mr. Cronk will develop magazine material for the further information of the industry, so that those interested will be kept abreast of the background and progress of the Show. Cronk served in a similar position with the 1957 Road Show.

The Exposition, historically known as "The Road Show," is being expanded to include equipment used by building and heavy construction contractors as well as roadbuilders. The last Road Show, also held in the Chicago amphitheatre, turned out to be the largest industrial trade show ever held. Billed as, "The World's Fair of the Construction Industry," it drew more than 70,000 contractors, builders, public works officials, and engineers.

Mr. Cronk and the Highway Information Services, which specializes in publicity and reporting to the construction industry, will work with a CIMA Publicity Committee headed by Donald V. Buttenheim, president of Buttenheim Publishing Company, and Harvey A. Scribner, president of Russell T. Gray, Inc., Chicago advertising firm.

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## "LET'S DO THE JOB—RIGHT"

*Continued from page 59*

one current proposal is to tuck forest and public land highway financing under this fund.

4. Other policy questions yet to be settled according to Congressman Fallon: whether and how to take over toll roads as part of the Interstate system; whether to dilute the Interstate road financing by admitting added mileage to the "I" system. This Washington leader concluded by stressing the growing importance of the defense aspect of the Interstate system.

### Policy Statement at Denver

AASHO's chief administrative officers drafted a 27-point policy statement at Denver. This 1,600-word statement among other things urged that:

—The "partnership" of the BPR and the state highway department, which has given the U.S. its world leadership in highways, should continue.

—The state highway departments must not be forced to conform to any preconceived type of organizational setup.

—The states should be allowed to continue with highway maintenance, policing, signing, marking and speed control with no federal requirements beyond those now in force.

—The departments should remain the sole agencies for administering the federal-aid programs at state level, while assuring cooperation with other interested agencies.

—Design standards, signing and traffic control should be kept in state highway department and BPR hands, and be established by engineering decisions rather than by legislation.

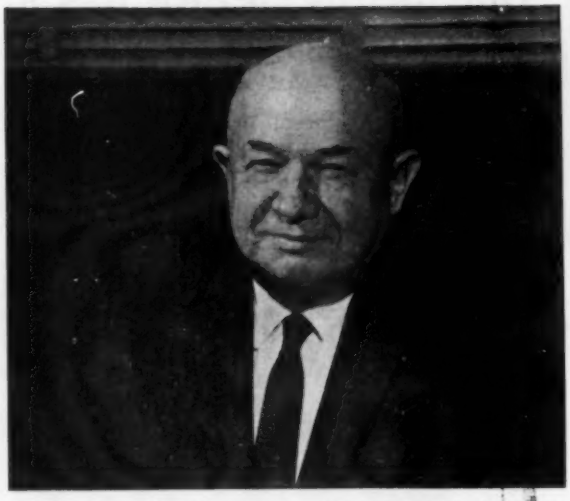
—Uninterrupted continuance of the greatly expanded highway program must be assured, so that the intent of Congress as expressed in the United States Highway Code, Highways, and the industry expansion based on that intent, will have meaning.

—Design standards should never be sacrificed for Interstate construction, but should be periodically reviewed. And no new mileage should be added to the Interstate system until the present 41,000-mile network is largely built.

The urban portions of the Interstate system, noted another clause, are an integral and very important part, and should be planned and developed by the state departments in cooperation with local agencies. "The importance of the urban sections cannot be overemphasized" this clause said, "and an eventually enormous increase in cost could come from failure to recognize the problem now." A comprehensive transportation plan should not be a requirement for the approval of an urban project, but the state engineers should lend all possible assistance in developing such plans.

### How Quality Control "Guide" Used

How the states have made use of AASHO's Project Procedures Guide was reported by Walter Johnson, Kansas State Highway Engineer. Quoting questionnaire answers from 46 member departments, Johnson revealed that the use of this publication has been far from uniform. While copies were supplied to top headquarters and district personnel, in many states the guide never go down to the inspectors snd laboratory men, where it could do the most good.



AASHO president-elect J. C. Womack, California's state highway engineer.

The guide had as one important objective to help administrators in a more rational selection of pavement types, and in aspects of contract administration. In both these areas Johnson said that while the guide's influence was marked, nevertheless many of its recommendations were not followed. Also missing from the picture in some states was any effort to issue supplemental instructions, as an aid to making the fullest staff use of the publication. A range of attitudes too was revealed with respect to specific procedures considered by the guide's authors to be of significance in quality control. For example, proof rolling: only seven states require it for subgrades or base courses, 33 states do not (20 said "essential" or "valuable," while 11 commented "no value.")

Particularly surprising, in Johnson's words, was the lack of interest in pre-construction briefing conferences. Only 15 states consider such meetings essential. The manual stressed the value of these conferences in securing good construction.

### Other Denver Highlights

A feature of the convention was the presentation of 25-year Awards of Merit to 91 state and BPR highway employes.

As with past AASHO meetings, concurrent technical or committee sessions were held and many papers given covering a score or more specialized fields. At the closing session brief reports were read on the following committees: administrative practices, highway finance, highway transport, legal affairs, right-of-way, uniform accounting, public information, factual surveys, electronics (subcommittee on radio), traffic, design, bridges and structures, construction, materials, maintenance and equipment, roadside development, re-

search activities, secondary roads, and urban transportation financing.

New AASHO Officers

J. C. Womack, state highway engineer of California, succeeds D. H. Bray, of Kentucky, as president of AASHO for 1962. Other officers:

Vice-presidents: John C. Mackie, Michigan highway commissioner (first v.p.); Wm. R. B. Froelich, chief deputy secretary, Pennsylvania; H. H. Harris, commissioner of highways, Virginia; Walter Johnson, state highway engineer, Kansas; G. Bryce Bennette, Idaho state highway engineer.

Executive committee members elected at Denver: E. S. Preston (Ohio), W. F. Babcock (North Carolina), Mark U. Watrous (Colorado), M. L. Shadburn (Georgia), W. C. Williams (Oregon), J. O. Morton (New Hampshire), R. E. Bradley (North Dakota), J. Burch McMorran (New York). E. L. Roettiger, state highway engineer of Wisconsin, is treasurer for 1962.

## Calls for Stepped-Up Research

Congressman John A. Blatnik's paper given at Denver went considerably afield from the investigative work for which his committee is famed. Reflecting a growing Congressional interest in top-policy aspects of the highway program generally, he called for greater effort in highway research.

"There is general agreement," said the Congressman, "that highway research by all agencies has not kept pace with the accelerated program, and that more highway dollars must be utilized in research than in the past." Blatnik pointed to Congress' recognition of the urgency of research needs. Under Sec. 307, Title 23, United States Code, Highways, 1½ percent of the federal-aid highway funds are made available for planning and research. This use is possible for two years after the end of the fiscal year of authorization; sums not so used then lapse back into funds available for construction. A total of $39.3 million was thus lapsed and lost to research in the 1955-1960 period.

The failure to fully utilize research funds, Blatnik continued, indicates that some states are advancing construction at the expense of research. But BPR effort is now being directed along with that of the Highway Research Board and AASHO to encourage more research by the state highway departments. The Congressman cited the 19 high-priority areas defined in 1939.

The Comptroller General in his report to Congress has recommended that the 1½ percent of funds be earmarked for research and planning only. The BPR has disagreed, voicing preference for the opportunity of fostering greater research under the present law rather than under a "use of loss" concept.

## UNBALANCED BIDS

*Continued from page 45*

The price, therefore, of any construction project is all that the bidders feel it will bring in the light of the two factors mentioned and of a particular contractor's need for work to keep his organization intact and his equipment producing. Competition has always insured *reasonable* prices and will always do so as long as construction is done by contracts awarded as the result of competitive bids rather than by negotiation.

The point we would make is that there is no such thing as a balanced bid, nor has there ever been a balanced bid submitted on any project for highway construction. There are far too many hidden items for which no direct payment is received to permit them.

Consider Section 103.01 of the current Virginia Specifications:

"The Commission reserves the right to reject any or all proposals, to waive technicalities, to advertise for new proposals or to proceed to do the work otherwise, if in the judgment of the Commission the best interests of the State will be promoted thereby."

With this all-inclusive "catch-all" provision they certainly don't need an unbalanced bid provision to clutter up the specifications with a duplication of reason. Under this provision alone they can reject his proposal anyway and anyhow. Why duplicate it?

We might, therefore, answer the question stated at the beginning, by saying that an unbalanced bid is a practical necessity since it embodies payment for work which must be done and for which no pay item is to be found in the contract. The provisions found in the specifications for rejecting bids for unbalancing, if enforced, would tend to strangle ingenuity, limit the adaptation of new methods and force the addition of many other items to the contract. Since it seems a duplication and impractical, would it not be better to eliminate this provision entirely?

## Aerial Speed Cops Check Minnesota Traffic

Airplane-shaped pavement markers are part of the traffic control scheme on key Minnesota roads. Painted at quarter-mile intervals the markers serve as timing gauges for observation with stop watches in overhead planes in checking the speeds of motorists below.

The Minnesota Highway Patrol has two Piper Apache airplanes which are used for this service. Among other duties when a motorist is found exceeding the speed limit, the pilot contacts a patrol car by radio. The pilot remains in the vicinity and the ticketed motorist is privileged to hear the two-way conversation between the pilot and the highway patrolman on the ground.

Minnesota highway officials report that this is an effective speed control measure since the motorist is usually unaware of this surveilance despite fair advance warning.

Tricks such as this have helped many a contractor move yardage in weather that used to keep the crews in around the stove.

# 8 Winter Earthmoving Tips

Cold wet winter weather really puts contractors to the test in getting the best from construction equipment, with frozen ground often the main adversary.

Because it is usually necessary to break through frozen layers with a ripper—and since ripping doesn't actually *move* dirt—ripping should be held to a minimum, advises the service department of International Harvester Company's Construction Equipment Division.

Here are other practical tips from this source:

(1) Keep the cut as small as practical. A relatively small section should be ripped and brought down to grade before the cut is enlarged. This way, each section will have to be ripped only once and not each morning.

(2) Fill small areas at a time. Plan the work to bring a small section up to grade as soon as possible. This also helps to reduce ripping and compaction requirements. Under some conditions, rock salt can be sprinkled on the fill to increase workability.

(3) Snow can be an ally in the contractor's struggle with frozen ground, through acting as an insulation blanket. In many instances, snow has reduced the freeze depth more than 50 percent. The recommendation is to remove snow only from the area to be worked in one day. The remainder should be left to retain ground heat.

(4) Watch your traction. Special safety precautions are in order for winter work. Frozen ground provides poor traction, which makes side-hill operations tricky. Whenever possible, the crawler should be kept perpendicular to the slope to get maximum grouser penetration. A slide to the bottom could be the result of moving across the side of the slope.

(5) Take it slower, maybe. Rough, frozen ground is not ideal for traversing at maximum speeds. Not only is the operator jolted, but expensive machine damage can result. Reduced speed is the byword here.

(6) Even better, rough areas should be eliminated as much as possible. One way to accomplish this is to leave the work area smooth before shutting down for the night. This way, churned up mud doesn't freeze into rough mounds and ruts.

(7) Proper shut-down procedure is particularly important in cold weather. Units should be parked on high ground and planks, if necessary, to prevent being frozen or mired-in the next day. Cleaning crawler tracks is standard procedure, but similar care also must be taken for rubber-tired rigs. If a scraper has fenders, mud must be cleaned out to prevent tire damage.

Frozen mud can make scraper apron and bowl inoperable, and it is extremely important to clean around this mechanism. Air brake tanks require draining every evening. Failure to perform this chore can result in condensation freezing —an untimely failure.

(8) Operator comfort is important at all times, and especially so in cold weather work. Canvas housing is widely used on machines to bring engine heat into the operating compartment. This arrangement is excellent, if extra care is taken to insure that all exhaust and manifold connections are leak proof to stop irritating fumes from being trapped in the operator's area.

Not fighting the wind also makes for more operator ease. The job should be planned to enable as much work as possible with the wind to the operator's back. Often, dozing can be performed with the wind and the return trip made quickly in reverse, with the operator's back still to the wind.

A final item: Before leaving a machine, the operator should cover the seat and the compartment with canvas, cardboard or plastic.

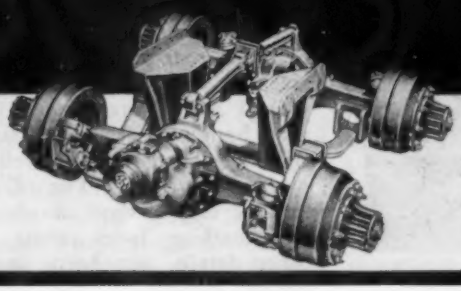
Nothing like a dry work area the next frigid morning.

# there's a ROCKWELL-STANDARD Driving Tandem for every kind of service

First developed by Rockwell in 1918, driving tandems offer four important advantages over single driving axles... *greater legal payload... greater traction... better flotation... smoother riding!*

Today, only Rockwell-Standard offers a complete line of driving tandem axles to meet every on-or-off highway need. Capacities are available in a range from 22,000 to 150,000 pounds—with axle ratio selection exceeding anything offered elsewhere in the industry.

One of the four types of driving tandems below is ideally suited for your particular requirements:



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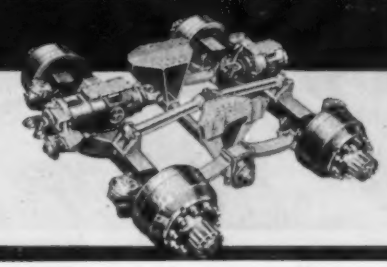

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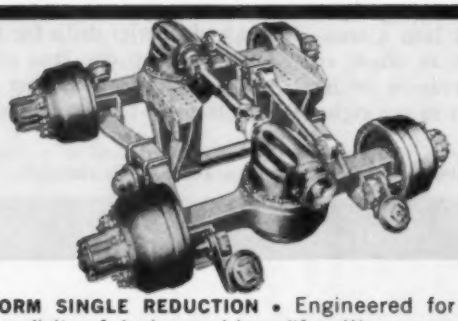
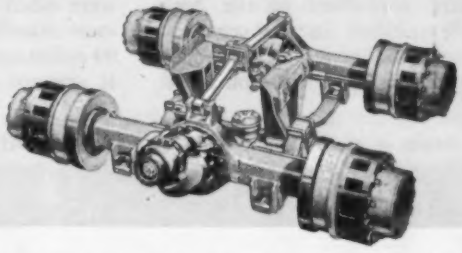


**WORM SINGLE REDUCTION** • Engineered for simplicity of design and long life • Worm gear may be reversed to increase operating life • Four models with capacities up to 50,000 pounds.



**FULL PLANETARY DOUBLE REDUCTION** • Engineered for extra heavy-duty operations • Planetary reduction is at wheel end for greatest mechanical advantage • Capacities up to 150,000 pounds.

*Products of...* **ROCKWELL-STANDARD CORPORATION**

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The third-laning was literally made possible by retaining wall, and precast concrete cribbing figured importantly in the Berthoud Pass job.

## MOUNTAIN PASS

*Continued from page 49*

the top. The hard-to-get-at areas were drilled with jackhammers. Secondly, the effect of the high altitude resulted in the compressors being able to furnish only about 73 psi to the drills compared to a normal 110 psi at 6,000 ft. elevation. As an example, one 600 cfm and one 900 cfm compressor were often connected into a common manifold to get as much as 90 psi to operate two crawler drills. It was not uncommon to use eight compressors (5,365 cfm) to operate five crawler drills and four jackhammers in one cut.

Timken carbide insert rock bits and Gardner-Denver steel were used. The rock encountered was about 50 percent extremely hard granite and the balance a softer rock. The contractor used lifter and down holes spaced so as to insure that the entire cut was blasted in one operation. Lifter holes were drilled at grade on about 6 ft. centers, to 2 ft. back of the ditch line. Down holes were spaced longitudinally on 6 to 8 ft. centers and to a depth of 2 ft. below grade. Down holes were started about 4 ft. out from the toe of the slope. The hole spacing varied somewhat according to the rock encountered and was governed by experience gained from cut to cut. For the most part, the spacing resulted in neat gradelines and little need for redrilling of any of the area.

Drill holes were plugged with pine boughs of sufficient size so that they filled the hole well and protruded slightly. The effectiveness of this method of plugging and marking holes, along with other details, was borne out by the fact that out of 2,500 holes, the contractor lost only three.

Tourist traffic interfered seriously with the drilling. Normally, drilling was shut down from 9:00 to 10:00 am. until piled-up traffic had gone through. The compressors and crawler drills for the lifter holes took up one lane of the existing highway, resulting in one-way traffic. This required a flag-

More details of the retaining wall construction, which also required careful planning to allow traffic through.

man at both ends of the cut.

Rock bits were sharpened on the job with a Gardner-Denver model G4 bit sharpener mounted on the rear of a 600 cfm compressor. Bits had to be resharpened after about 25 ft. of drilling in the hard granite.

Each crawler drill got about 850 ft. of hole per shift in hard rock on the down holes and about 475 on the lifter holes. The four jackhammers totalled about 700 ft. per shift.

The drill foreman estimated that the high altitude reduced worker efficiency by half. Normally, it required a workman two weeks to get partially acclimated. The drill crews were mostly local miners with long experience in handling the type of rock encountered.

The blasting crew was also made up of hard rock miners from the local area who were completely familiar with the amount of explosives required for the job. This varied from ½ to ¾ lb. per cu. yd. of rock produced.

The work-horse explosive was DuPont Red Cross 40 percent dynamite in 2" x 16" sticks. DuPont Nitramite FR nitro carbo nitrate was used with the dynamite whenever dry holes permitted. Most holes were wet due to side-hill seepage.

The hole loading procedure was to place an electric blasting cap in the stick at the bottom and supplement this with Primacord. The use of Primacord was a safety factor as well as for the purpose of producing rock. The contractor stated that he felt this safety practice to be economical. Ten feet of Primacord was assumed to have the same blasting effect as one stick of dynamite. In the event the wire to the electric blasting cap was cut, or for some other reason the shot failed to fire, it was then possible to place a cap on the Primacord and fire any misfired holes without the necessity of blowing them out and recharging them.

The explosives were loaded to a height 6 to 8 ft. below ground level, depending upon the type or rock encountered. A typical blast involved 330 holes and 5,000 ft. of Primacord.

The blasting foreman reported that static electricity and the daily thunderstorms encountered at the high altitude caused concern. He explained that parallel wires tended to pick up static and could possibly fire the electric cap prematurely. Since the lightning and static occurred mostly in the afternoon, the plan was to wire the holes before noon if possible. Wires to the blasting caps were twisted to avoid the danger from static electricity. A direct hit by lightning was the principal hazard. In the instances where wiring was not completed at the time an electrical storm occurred, the blasting crew left the area until the storm was over.

The loaded holes were stemmed with rock dust and dirt and firmly tamped. Stemming bags were used in many instances.

*Grading.* Shovels and rear-dump trucks were used exclusively to move the rock. A Bucyrus-Erie 5-yd. 88-B and two Northwest 80D 2½-yd. shovels loaded to a fleet of Euclids. Cat D9 and D8 dozers worked with the shovels and at the fills. The depth of fill layers was governed by the dimensions of the largest rocks being placed. In some locations the shovels could cast the fill directly. Average production was about 3,500 cu. yd. per 8-hour shift—considered "good" under the conditions.

Separate haul roads were impossible in the rough terrain. The rear-dumps operated, along with highway traffic, on the existing road. This slowed work appreciably and made turning around difficult. This condition necessitated frequent patrolling to keep the road clear of loose rocks, and constant springling to lay dust.

*Concrete Cribbing.* The bid schedule included precast reinforced concrete cribbing as an alternate to metal cribbing. The concrete cribbing proved to be $700 cheaper for this project. Fig. No. 1 shows the details of the stretches and header units. The cribbing was cast and furnished by American Marietta in Denver and placed under a subcontract by J. W. Brown of Denver.

An International Harvester TD-30 dozer benched the steep slopes to prepare a base for the cribbing. Final base grade was cut largely by hand labor. The cribbing units, many weighing over 500 lb., were piled conveniently along the road edge. A Little Giant crane used a Marietta-designed clamp to pick up and lower the units into place.

Backfill for the cribbing was

Skillful dozing by this International TD24 operator was necessary to cut pioneer trails and trench the footings of wall cribbing.

Ingersoll-Rand Crawl-IR drill with 600 compressor starting a shelf cut-back.

truck-hauled and end-dumped in place. A Koehring 330 dragline with clamshell bucket distributed the backfill in thin lifts for tamping with hand-operated pneumatic equipment. Once the cribbing was well started a front-end loader took over for the clamshell.

*Servicing and Fueling.* Equipment repairs were accomplished on the job by well-equipped welding and mechanics' trucks. Three 6,000-gal. fuel tanks with safety dispensing pumps and meters were installed at the top of the pass, two for diesel fuel, the other for gasoline.

*Engineering Design.* While the existing grade averaged 4.7 percent, the steepest grade was 6.35 percent. Three curves had centerline radii varying from only 135 to 160 ft. and interior angles up to 223 degrees. Design speed for these curves was as low as 20 mph.

Drainage structures included 208 ft. of 60-in. 8-gauge corrugated metal pipe, 3,880 ft. of 24-in. pipe and 72 ft. of 8-in. Subdrainage used 5,014 ft. of 12-in. perforated cmp and 3,100 ft. of 8-in. size.

The accompanying sketch shows the typical cross section. The third lane will be reserved as a climbing lane for slow-moving vehicles. Hubner's contract included 59,100 tons of grade C gravel or crushed rock surfacing. The project will be paved during the 1962 summer.

*Equipment and Men on the Job.* This project saw one of the largest assemblages of new equipment in Colorado highway construction history.

The principal equipment units other than the shovels consisted of a Cat D9 dozer with ripper, five D8 dozers, two International TD-24s with dozer equipment, one D8 drawn scraper, five Euclid R-27 rear dumps, one Euclid 10-yd. Euclid rear dump, two LeTourneau-Westinghouse 27-K Haulpaks, three 900 cfm compressors, three 600s and one 250, six track-mounted drills, and eight jackhammers. The air equipment included Gardner-Denver's new SP600 and SP900 Rota-Screw compressors as pictured, and Gardner-Denver ADT3000 Swing Boom Air Tracs and PR123 Power Rotation rock drills.

For the contractor, A. M. (Spec) Willis was project superintendent; Ray Clark assistant superintendent; Whitey Rea, master mechanic; Harrison Phelps was project engineer for the Colorado department of highways and Reuben Hopper resident engineer. The project was under District 1 at Denver; George Miles, district engineer and Fred Stearns district construction engineer.

## New Steel Research Labs!

The Bethlehem Steel Co., in a constant effort to keep pace with the increasing demands of the space age, to meet the growing threats of foreign steel competition and competition from other domestic materials, has constructed the Homer Research Laboratories on top of South Mountain, in Bethlehem, Pa.

Named after the company's present chairman, the seven building project consolidates previously scattered Bethlehem research activities. Research will involve not only bench-scale work in laboratories, but pilot manufacturing plants. From right to left in the picture are the Administration and Laboratory Building; Shop and Warehouse Building; Pilot Plant Building (one wing completed); Central Heating and Refrigeration Building; Photography Building. Also shown is the 210-ft. diameter cooling pond for the air conditioning system.

## New Ruling On "Owner-Operators"

The General Counsel of the Bureau of Public Roads sent a Circular Memorandum to Regional and Division Engineers concerning bona-fide "owner-operators" who are independent contractors. Reaction to this announcement was quick to get into print. For example, a bulletin of the Maryland Highways Contractors Association, Inc., said, "This is a matter which has been a difficult one for contractors and awarding agencies since the basic premise was ridiculous. . . . This Memorandum represents progress, since it states: 'bona-fide owner-operators who are independent contractors will not be considered employees and/or laborers and mechanics within the requirements of such laws' (Davis-Bacon Act; prevailing wage provisions of Section 113 of Title 23, United States Code, and related Acts, the Copeland Anti-Kickback Act and the 8-hour law.)"

The Memorandum rescinds the previous instructions, which required the application of such requirements to bona-fide equipment owner-operators who conduct their business as independent contractors at unit prices, or who render services under other contractual relationships which do not constitute "employment" within the normal meaning of that term.

The memo further states that "this matter should be given close attention until it becomes evident that all interested parties fully understand the scope of this ruling. . ."

The original letter from the Solicitor of Labor, on which this Circular Memorandum was based, included the following: "provisions of the Davis-Bacon and related Acts will not be applied to bona-fide owner-operators of trucks or other similar construction equipment who are independent contractors, until such time as it may appear to be practical to devise workable and easily enforceable procedures for obtaining compliance with respect to such owner-operators. The certified payrolls including the names of such bona-fide owner-operators need not show hours worked nor rates allegedly paid, but only the notation 'Owner-Operator'."

Why should fuel tanks always be horizontal? Answer: They don't need to be The big 10,000-gal. upright tanks, shown on a western Kansas project, are road transported and easily set up in the convenient arrangement pictured.

# Flexible Fuel Tank Set-Up

An example of a fuel storage and transfer dock designed for a contractor's particular needs is that employed by San Ore Construction Company, of McPherson, Kansas. This leading Kansas road building company, headed by M. Clare Miller of AGC fame (he is currently national president) has required very large gallonages of diesel fuel, and also a goodly amount of gasoline, for some of its larger road jobs.

As seen on the firm's I-70 project near Wakeeney, Kansas, in 1960, the facilities included two 10,000-gal. vertical and two 2,000-gal. horizontal tanks arranged in a row along the project work yard. One pair of large and small tanks contained diesel fuel, and one pair gasoline. The smaller horizontal tank in each instance served as an auxiliary to the larger one. The reason for this arrangement was that the large tank's transfer equipment didn't lend itself to reloading into the firm's own transports or construction equipment.

The project served by this setup was supplied by Mobil Company's refinery tankers of 5,000 to 6,000 gal. capacity. The pumping on the smaller tanks was done with Gas Boy equipment, made by W. R. Wilson's Sons, Inc.

In commenting on this facility, Mr. Miller said that his firm keeps accurate records on the fuel consumption of each major equipment unit owned. This is done for accurate cost accounting, and also has a bonus advantage of making possible fuel consumption comparisons, which in turn often help spot equipment in need of overhaul or replacement.

*Paving contractor's report on 873:*

# "Helped us get 25% more work in slack time"

Don Broughton, Springfield, Illinois, tells how a compact Barber-Greene 873 Finisher proved a king-sized profit maker by increasing business 25% for P. H. Broughton & Sons:

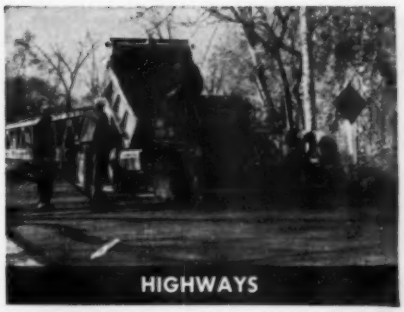
"The bulk of our asphalt paving contracts have always been on state highway jobs. And the slack time—between projects, on week-ends, even hold-ups while projects were in progress—was overhead we had reluctantly lived with as inherent in our business.

"But this amazingly versatile and highly portable Model 873 is the machine that helped us convert slack time into 25% more business—doing all types of paving jobs."

Contractors who have operated with the 873 have found its compact design the economical answer to pave driveways, parking lots, city streets etc. with highway quality surfaces.

These features make the 873 the most profitable compact finisher: paves on crawlers to 50 f.p.m.; travels on pneumatic tires to 30 m.p.h.; basic 8′ paving width variable in 3″ increments from 6-12′; full-width tamping for maximum compaction; 8′ travel width; automatic leveling; simple, positive control with single "joystick" steering lever; hydraulic folding hopper; easy, accurate thickness control; and fast crown adjustment while paving.

Let your Barber-Greene Distributor show you the 873's profit advantages—whether you are just starting in business or are looking for paving equipment that means extra business in slack time.



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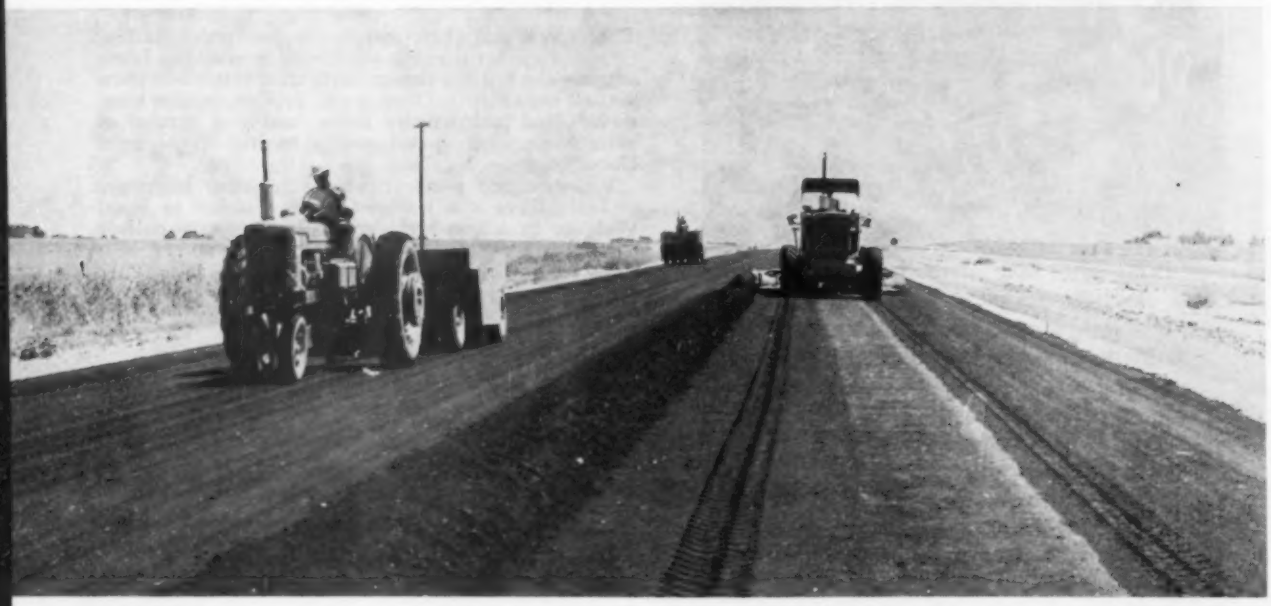
Hot base course aggregate mixed in an Eagle pugmill was hauled in Omaha Standard bottom-dump trailers, International R190 tractor-drawn.

Motor grader spread aerated base course in 3-in. lifts which were compacted by pneumatic rollers.



By H. K. Glidden
*Field Editor*

**Bituminous Roads And Streets**

**Bituminous features appear on pages 80 through 89**

# MC4 Hot-Mix Base For Kansas 'I' Project

***Combination of dryer and pugmill supplanted windrow mixing to overcome drying problems in stabilized base production***

The Kansas Highway Department's solution to the scarcity of suitable base aggregate in western Kansas was fully described in Roads and Streets, October, 1959. At that time the contractor, San Ore Construction Co., of McPherson, Kansas, had experienced some difficulty in drying road-mix base material in windrows to the required one percent moisture content. However, the magnitude of this problem was not fully appreciated until rains later in the 1959 season caused 77 days of lost time. When this same contractor was the low bidder on an adjacent 20.6 miles of similar construction, it was realized that the job could be speeded up at a great saving if windrow drying time could be reduced. Here is how this difficulty was practically eliminated by central plant mixing of hot aggregate and heated MC4.

San Ore Construction Co. was given notice to proceed April 25, 1961, for four adjoining contracts in Gove and Trego Counties, totalling $3.7 million. The contract time of 125 days ran concurrently for all projects and carried liquidated damages in the amount of $300 per day for each project. The contracts covered bituminous base course, shoulder grading, hot-mix surfacing and miscellaneous items to complete this section of Interstate 70. As of mid-Autumn, the project was on schedule with completion estimated late in 1961 or early in 1962, depending on weather conditions.

The principal road mix quantities were 457,000 tons of dried aggregate at $1.75 per ton, 4,954,000 gal. MC4 at 12 cents, and a base course manipulation item at 90 cents per ton. The principal hot-mix surfacing quantities were 142,000 tons at $6.75 per ton, and 2,388,000 gal. of asphalt cement at 11 cents.

San Ore subcontracted the hot-mix and shoulder paving of section 1 to the Ark Valley Construction Co., of Wichita, Kansas; all concrete work, fibre glass bank protection, and culvert pipe to the E. W. Blair Construction Co. of Quinter, Kansas.

## Method Has Success History

From the experience gained on the previous project, Everett Davidson, San Ore's project superintendent, proposed the use of hot-mix methods to produce the road-mix base. Davidson encountered a number of objections to his proposal. The major one was that MC4, heated to 220° F., might catch fire when mixed with hot aggregate in a pugmill. Another factor was the considerable investment in plant equipment in order to try out his method. It was ultimately decided that this hot-mix would be used on the center eight miles of the entire project, and that conventional road mixing would be employed on both ends as originally planned. The idea was, one way or the other, to expedite preparing base for surfacing.

The contractor had available a Barber-Greene model 896 Batch-O-Matic hot-mix plant which could be used until surface pavement was started. However, this one plant could not produce enough base mix to meet construction schedules. Therefore, Davidson supplemented this plant with new equipment in the Hecker pit, four miles north of the center of the project.

The equipment in the Hecker pit used three sources of aggregate to obtain the required gradation. The aggregate was fed to conveyor belts in the proper proportion by

oscillating feeders. The aggregate was then dried in a Barber-Greene 7' x 30' experimental model dryer, equipped with a dust collector. The hot aggregate was elevated by a 36-in. conveyor to a 5,000-lb. Eagle pugmill. The MC4 was heated in a Cleaver Model 2 bituminous booster to 220° F. The hot oil was pumped to the pugmill through a Neptune meter borrowed from a road mixer. The hot-mix base course aggregate was then loaded into Omaha Standard bottom-dump trailers pulled by International Harvester R 190 truck-tractors. These units hauled an average of 36,500 lb. net and were weighed on state scales at the pit.

The experimental nature of the construction method proposed by Davidson resulted in the Hecker plant equipment leaving something to be desired in the way of refinements. Some difficulties were experienced for lack of provision for screening and bin storing the various aggregates. The screening difficulty was largely overcome by a laborer hand picking occasional larger lumps of bonded aggregate particles from the conveyor belt feeding the dryer, and by the pulverizing action of the dryer.

The rate of feed of the three sources was checked at the site by running at least 15 aggregate gradation tests per day. The oil content based on the mean of New Mexico and Nebraska formulas was 4.5 percent of MC4. The oil content was based on frequent five-minute tests for determine the rate of plant production. The procedure was to load a truck for five minutes and then weigh it. The net weight was converted to tons per hour. This figure was referred to a chart to find the proper gal. per min. rate at which the asphalt should be fed through the meter. One employe constantly watched the meter and regulated the rate of pumping to secure the required amount of asphalt.

The equipment at the Hecker plant produced 135,000 tons of base material without causing a fire or other insurmountable difficulties. Average production was 180 tons per hour. This plant definitely proved Davidson's contention that MC4 could be mixed hot to produce base course material.

The Barber-Greene Batch-O-Matic plant produced 72,000 tons of base course aggregate before it was put into production for the hot-mix surfacing. Combining aggregates and metering asphalt were easier with this automatic plant. However, the daily rental charged was such that its use would not normally be warranted for such work, despite its average rate of 200 tons per hour.

The low clearance below the bottom-dump delivery trailers required that the base material be deposited initially in two windrows, also two windrows provided more uniformity of aggregate in windrow equalizing windrow size. These windrows were ultimately combined into one for aerating and spreading.

The effectiveness of Davidson's method was proved by the fact that there was practically no lost time due to rain. The only wet weather difficulties occurred in laying the first course. The soil sometimes accumulated moisture and required drying before the base could be applied. There was practically no delay in windrowing the upper courses.

The principal advantages in hot-mixing the base material were the reduction of moisture content of the aggregate to one percent or less by the dryer and the rapid loss of volatiles due to the hot processing. The MC4 contained 13 to 14 percent volatiles by weight. It was estimated that 10 to 15 percent of these volatiles were removed in the hot processing. Ideal laying conditions prevailed when at least 30 percent of the volatiles were removed before the base was spread and compacted. Although on hot windy days the hot-mix base could be spread in less than two days, the contractor allowed two full days as the average time. The initial 3-in. lift on the subgrade was compacted by sheepsfoot rollers; the subsequent layers by pneumatic rollers. The hot-mix method also eliminated much of the blading back and forth of the dry windrows for the purpose of mixing and aerating.

## Examples of Windrow Woes

Two experiences with conventional in-place mixing of the ends of the project illustrate the saving by the hot-mix method. In one

*Continued on page 84*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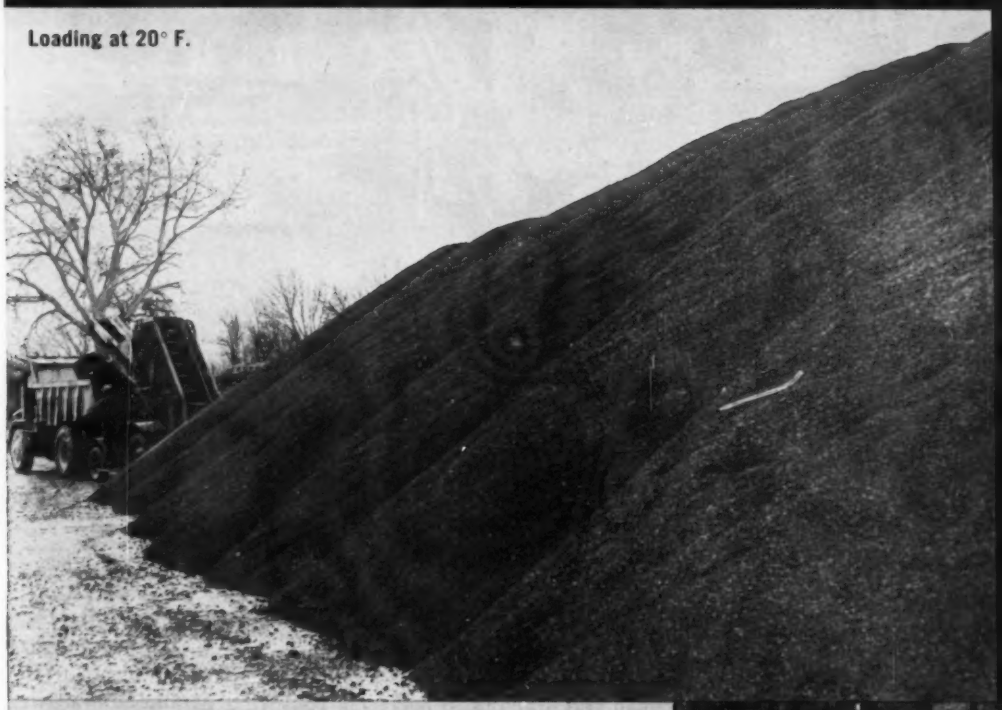

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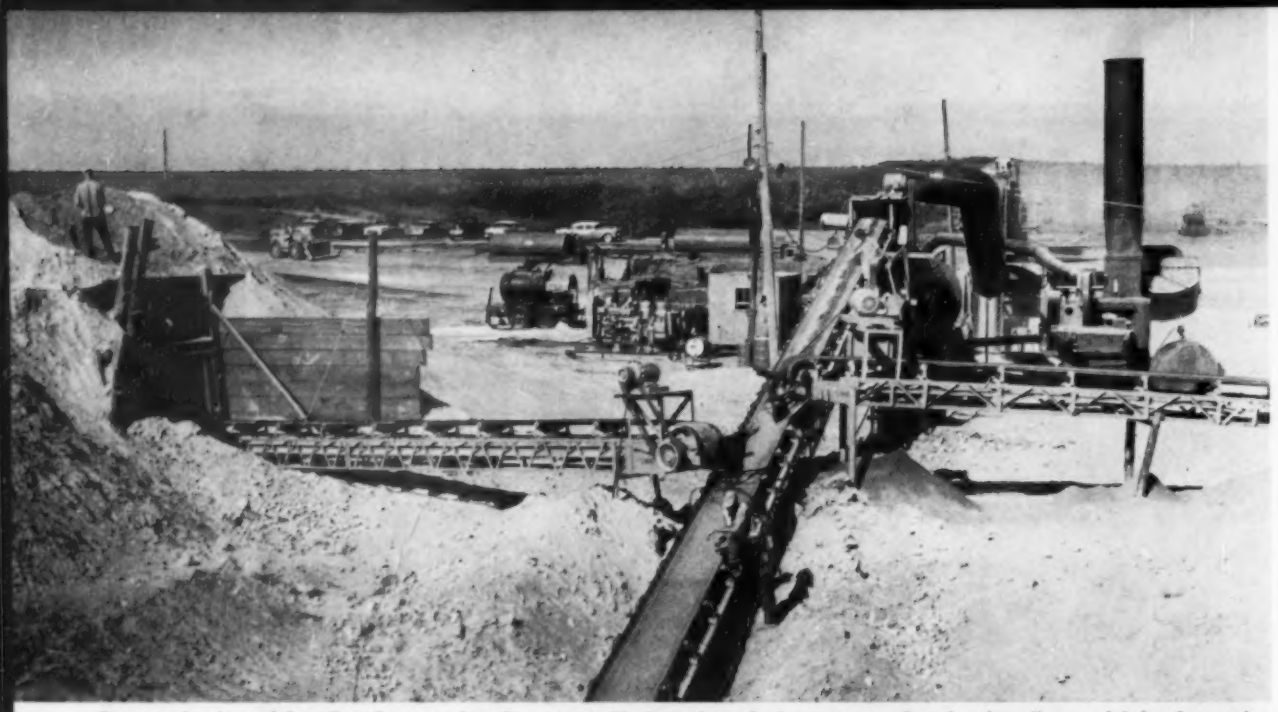


Panoramic view of San Ore Construction Company's Hecker pit and plant, expected to be the pilot model for future improvements of this hot-mix base method. Three conveyor belts fed the dryer. Pit aggregate belt in foreground, silica belt at left, and sweetner belt at right.

instance, approximately 2.5 miles of windrow was made ready for the application of asphalt on Memorial Day. It rained that night, and on subsequent occasions, making it impossible to process this windrow until June 14. In another instance a long windrow was in proper condition for asphalt application three different times before it was finally processed.

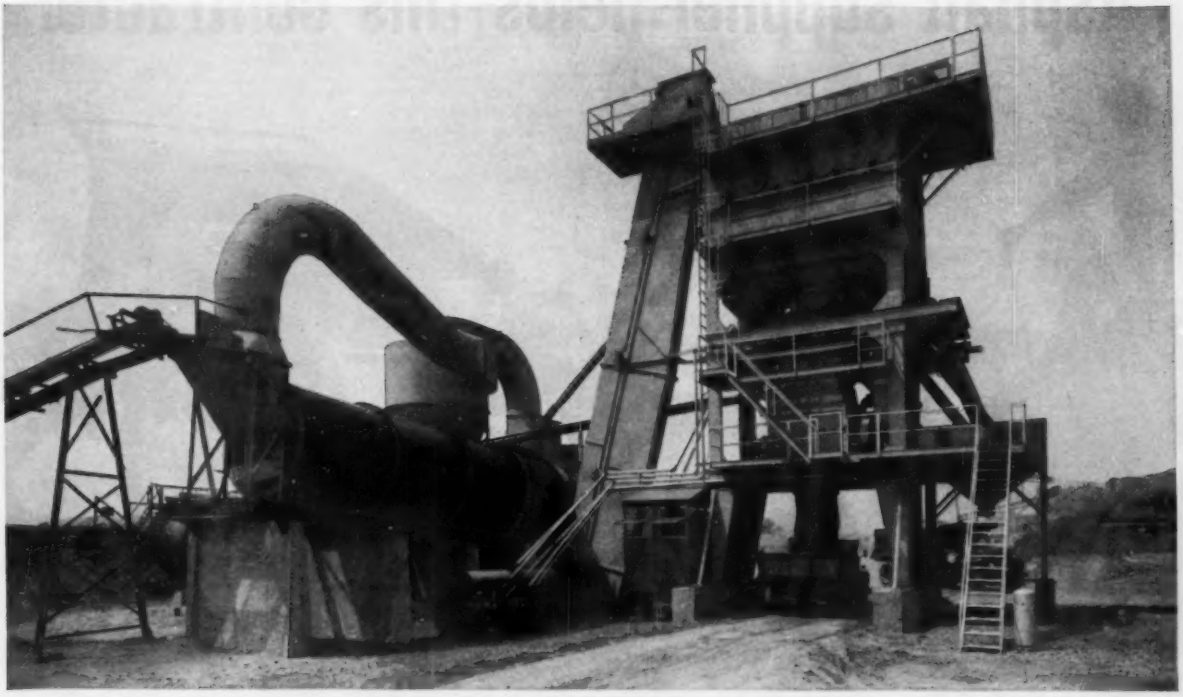
A Cat D8 dozer worked the Hecker pit to furnish 75 percent of the aggregate for this plant. River sand in the ratio of 15 percent was truck-hauled in and pit-handled by an Allis-Chalmers HD6 Tracto-Shovel and a Cat 944A. (These two loaders alternately worked the traps and maintained haul roads.) Effective fines were increased by blending 13 percent silica, truck-hauled from a nearby pit. The two loaders also fed this trap. Since the silica was not screened, it was often fed onto the belt in a rather lumpy condition. To break up the silica, the contractor installed rollers consisting of automobile tires, above the belt after the feeder.

Out on the grade, project chief Davidson advised that the Preco-equipped Cat 12 motor grader was an indispensable item. This machine was used exclusively for shaping the shoulder subgrade and the final lift of the base course.

*Continued on page 87*

Barber-Greene 7' x 30' experimental dryer and dust collector in foreground, with 36-in. conveyor belt feeding pugmill.

*THE USEFULNESS OF A LIMA MADSEN*



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# How on-the-spot attention from an Asphalt supplier helps this contractor

Good weather or bad, where there's Asphalt going down, American Oil's Joe Steck is there to give the contractor the service he needs. Here Joe checks on a shopping center surfacing project with Shumaker's R. G. Pond.

**by J. K. STECK**

**About the Author.**

*Joe Steck knows about providing technical service to Asphalt contractors because he has been doing it for over nine of the 15 years he has been with American Oil. His background, in addition to this experience, includes a degree from Earlham College.*

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Shopping center parking areas, school playgrounds, residential driveways, street and highway improvements—no Asphalt job is too large or too small for Shumaker Brothers Industries in the city of Indianapolis. Contracts of this kind demand that Asphalt deliveries be on time and that these materials meet specifications. Specification material arriving on time results in (1) keeping each job on schedule, (2) avoiding idle time for crews and (3) permitting efficient and economical use of equipment on a maximum number of projects.

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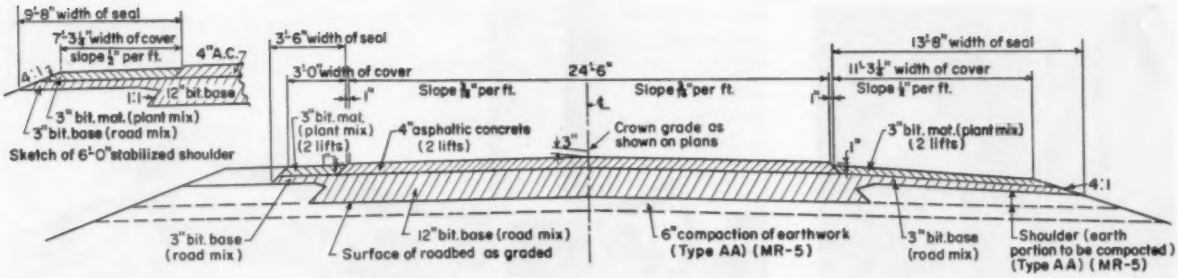
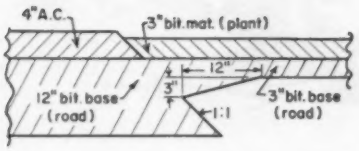

9'-8" width of seal
7'-3½" width of cover
slope ½" per ft.
4" A.C.
4:1
1:1½
12" bit. base
3" bit. mat. (plant mix)
3" bit. base (road mix)
Sketch of 6'-0" stabilized shoulder
3'-6" width of seal
3'-0" width of cover
Slope ¼" per ft.
24'-6"
Slope ¼" per ft.
3" bit. mat. (plant mix) (2 lifts)
4" asphaltic concrete (2 lifts)
±3"
Crown grade as shown on plans
13'-8" width of seal
11'-3½" width of cover
Slope ¼" per ft.
3" bit. mat. (plant mix) (2 lifts)
4:1
3" bit. base (road mix)
Surface of roadbed as graded
12" bit. base (road mix)
6" compaction of earthwork (Type AA) (MR-5)
3" bit. base (road mix)
Shoulder (earth portion to be compacted) (Type AA) (MR-5)

Cross-section of the I - 70 western Kansas project.




An important detail: tying the asphaltic base into the granular shoulder base.

A noteworthy feature of the hot-mix surfacing was the specification requirement for the use of the Drake stringlining method (described in Roads & Streets, October, 1960).

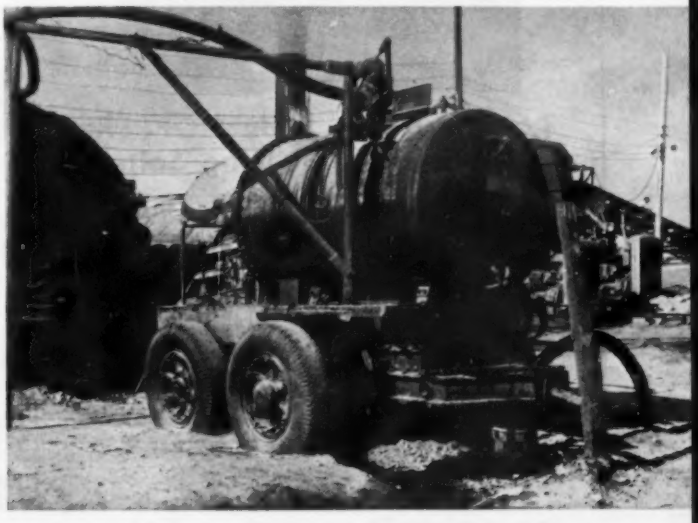
## Quality Control Procedures

Roscoe Wall, resident engineer, used an average of 49 employees in the staking and quality control on this project. Five were in the office, survey parties accounted for five, the rest in testing, inspection, or scale operation. There were five portable laboratories on the project. Two were equipped with stills for running volatile extraction tests. The others were set up for graduation and compaction testing.

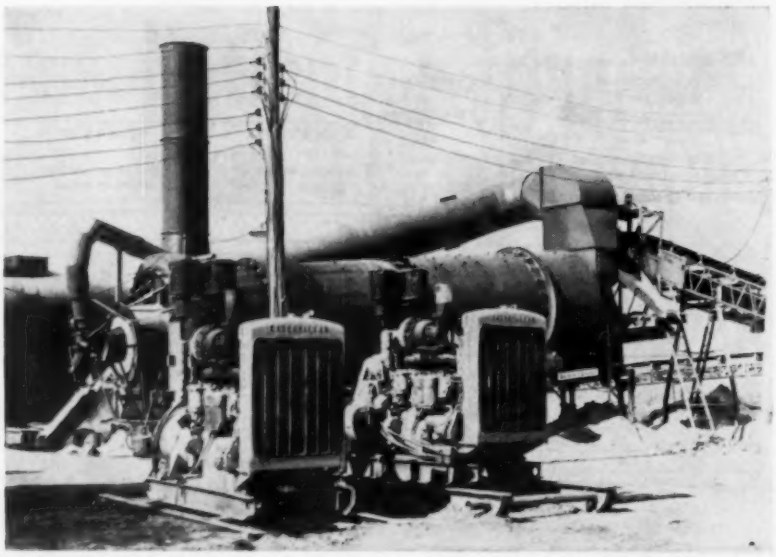
The laboratory at the Hecker plant was typical. This one was primarily concerned with gradation tests of the base course aggregate. The dry sieve analysis was by conventional methods. Since the percent of effective fines in the aggregate was critical, all samples were washed. One of the accompanying photographs illustrates the equipment which the Kansas highway department developed to speed up and eliminate much of the drudgery from the wash test. This equipment consisted of an electric motor to provide agitation of four screens. The screens used were ¾ in., No. 10, No. 40, and No. 200. Below these four screens was a pan. The three top screens were primarily for the purpose of protecting the 200-mesh screen from damage by large particles. Water was pumped over these four screens continuously. The percentage of the effective fines was determined by dividing the weight of the dry material passing the 200-mesh screen by the weight of the material passing the wet 200-mesh screen. Effective fines had to be at least 40 percent. Another specification required that the wash range must be from 6 to 12 percent of the total weight of the sample. It was also required that there be not more than 25 percent difference in weight of material passing any two successive screen

Bottom-dump trailers spread hot base course in two small windrows instead of one large one to provide for more uniform gradation of aggregate.

Cleaver bituminous booster heated MC4 to 220° F.



Power operated wet sieve shaker developed by the Kansas state highway personnel used to determine effective fine on the I - 70 project.



Two Cat D337 electric sets furnish electric power for the entire Hecker plant.

sizes in the total series—1½ - ¾ - ⅜ - No. 4 - No. 8 - No. 16 - No. 30 - No. 50 - No. 100.

Everett Davidson was project superintendent for San Ore Construction Co., Ralph Johnson, Harold Webb, and Francis Ulrey were base foremen, William Nuttall, foreman on laydown of hot-mix, Herman Rau, at the Barber-Greene 896 plant, C. E. Shufler foreman at the Hecker plant, Roscoe Wall was resident engineer for the Kansas highway department.

Gradation specifications for the base course were:

| Screen Size | Retained Percent |
|---|---|
| 1½ in. | 0 |
| 1 in. | 0-15 |
| ⅜ in. | 1-30 |
| No. 8 | 20-50 |
| No. 30 not more than 80 | |
| No. 200 | 88-94 |
| Plastic Index | 0-6 |

Screen spread specifications

There shall not be more than 25 percent of material between any two successive sieves in the total series: 1½ in., ¾ in., ⅜ in., No. 4, 8, 16, 30, 50, and 100.

## Right-of-Way Manual

An 80-page visual aid manual to help right-of-way buyers in transactions with property owners—said to be the first of its kind—has been published by the Michigan state highway department under right-of-way division director Victor H. Eichhorn. The manual is illustrated to help in quickly giving property owners a picture of the right-of-way transactions. Kenneth D. Erwin, administrative analyst in R-W division's Education and Training Unit is the author.

The manual is loose-leaf and pages have been laminated for ease in cleaning. Chapters deal with construction of highways, from the time the need for a highway is determined until it is open to traffic. Pictures and drawings are used to explain various technical features of new highways.

Other chapters cover responsibilities and rights of property owners and of the highway department, steps of buying right-of-way, land values after highway construction (with data on land economic studies).

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"Watchman" Hoppers have no moving parts. Bulk de-icing salts flow by gravity into the spreader. Travel and spread with the dump body in the normal "down" position.

There are two sizes for dump bodies: 3 or 5 cu. yd. . . . enough salt for 25 miles. The "Scotchman" spreader used is a standard unit equipped with a Type V-3 Electric Cab Control which provides for one man operation. Install or remove the "Watchman"-"Scotchman" combination in less than 20 minutes.

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## Asbestos-Asphalt Test Strip Placed in California

A highway paving research project has been initiated in Contra Costa County, California, which represents the combined effort of the Asphalt Institute, the University of California, the City of Martinez, the California Division of Highways, and Johns-Manville.

The project involves a strip on Shell Avenue north of Pacheco Boulevard, Martinez, California, and involved placing of about 1,500 tons of asphalt concrete surfacing. Some of the surfacing is a conventional mix. The remainder contains 2.5 percent asbestos fiber for reinforcement. The purpose is to test the strength and durability of the various mixtures under heavy truck traffic. The County public works department and a committee representing the major contributors supervised placing and compacting of the material.

The complex instruments for the measurements to evaluate the paving performance were installed by the University of California with the assistance of the State engineers. Basic research and preliminary investigation leading to the development of the new paving mixture were done by the Johns-Manville Research Laboratories and the Asphalt Institute Laboratory at College Park, Maryland.

The City of Martinez and Contra Costa County will assume the cost of placing the experimental pavement, which cost will not be more than that of the asphalt concrete overlay which has been budgeted for Shell Avenue.

The information which will be obtained from this project, it is hoped, will result in improved paving materials with longer life and reduced maintenance cost.

## Traffic Control Up-Graded In Missouri Department

Reflecting the increasing official attention being given to the operation of completed highways, the Missouri state highway department has raised the status of its traffic control section, now called the division of traffic control. Leon W. Corder, who has headed the section will continue as chief of the new division which heretofore has been part of the division of maintenance.

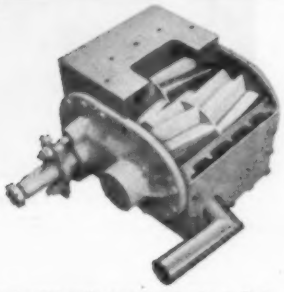
The responsibility of the new division will be to conduct tests involving traffic, set standards, and write specifications for lighting traffic control devices, signs, signposts, striping, paints and all striping equipment.

Design layouts for both the district offices and the main office involving interstate road signing, lighting and signal contracts and for the maintenance work program for these roads will come under the new division.

The division will also serve as a consultant with the division of surveys and plans on intersection and channelizing design, and on signal and lighting layouts; preparation and establishment of entrance driveways and excavation permits; and maintenance of records involving traffic accidents.


**2 features you can't afford to be without...**

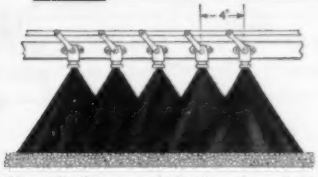
**1 THE BEST PUMP**



Capacity 400 gallons per minute • Patented staggered "herringbone" impellers • 9 gear-teeth • Self-draining • 4-1/2" suction . . . 4" discharge • Quiet operating • Only two moving parts • Easy servicing.

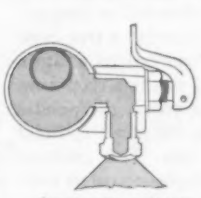
Etnyre FX-500 is the *only* distributor with a heat-jacketed pump. Engine exhaust is directed into jacketed pump case which surrounds pump impellers, then into intake valve above pump after passing through ducts in pump case. Suction on top and discharge at bottom make pump self-draining — no low points to trap material. Eliminates fire hazard of flame heating from burner.

**2 THE BEST SPRAY BAR**

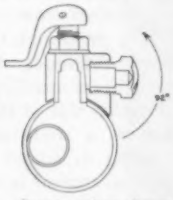



Triple lap material coverage. With nozzles on 4" centers, spray from each nozzle overlaps two other sprays.

New lighter weight bar has full material circulation with 92° rotation up from spraying position. Complete valve drainage . . . NO possible drip! Pressure circulation assures instant and complete shutoff . . . clean starts and stops. Uniform spray from one end of the bar to the other.



Cross section shows new TUC Bar with valve and nozzle in spraying position.




Cross section shows bar rotated 92° — valve completely drained.

Notice that no part of valve extends into bar to reduce circulation.

E. D. ETNYRE & CO.
Oregon, Ill.

**ETNYRE**
BITUMINOUS DISTRIBUTORS

. . . for more details circle 291 on enclosed return postal card

# NEW PRODUCTS

**Listed here are reviews of new and improved equipment items, selected to aid our readers in purchasing. See reader service numbers on enclosed postcard.***

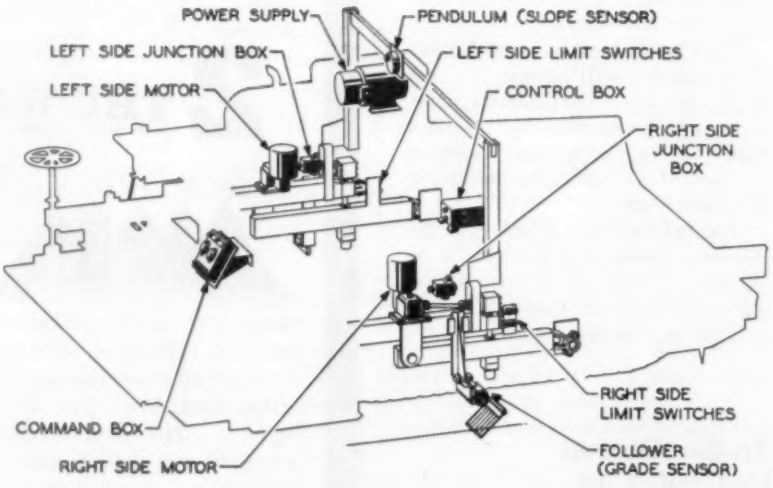
## New Automatic Paver System Controls Laydown Thickness and Slope

A new all-electric depth-slope control system which enables paving contractors to lay uniformly even and smooth mat automatically, regardless of subgrade irregularities, has been developed by Iowa Mfg. Co. in conjunction with Minneapolis-Honeywell, leading suppliers of automatic controls. The purpose of this new Electromatic Screed Controller System is to assure accurate control of mat depth or thickness and to provide a precise slope angle for the road crown. The first course can be laid to an even elevation over the roughest subgrade. The amount of mix required for second course can be predetermined, allowing the more exact cost estimates.

Basically, the screed control consists of a command panel, pendulum, grade sensor, control box and a servo-motor located on each side of the paver. The command panel, sensor and pendulum feed electric signals based on desired and existing grade and slope into the control box. Using these data, the control box electrically controls the servo-motors to vary the screed attack angle, automatically compensating for any road irregularities. A dial on the command panel sets the desired slope. Indicators show any deviation from the required slope and grade, and show performance of the control system at a glance. Once the grade and slope are set, operation is entirely automatic. However, by simply touching a toggle, operation of either or both sides can be switched from automatic to manual.

The pendulum furnishes a true horizontal reference. Fastened to a transverse beam attached to the screed arms on either side of the paver, the pendulum is a urethane-and-steel cylinder floating in silicon oil. The artificial horizon created is almost errorless even in running over very rough ground. The sensor measures desired grade. An attached grid rides on a taut string, accurately positioned to correspond to the desired mat level. Any base irregularities which cause the paver crawlers to drop or rise even slightly are sensed

**Cedarapids Paver With Electromatic Screed Controller**




**Details On Electromatic Screed Controller**

*To readers outside of the United States—postal rules forbid use of business reply cards outside of the U.S. Please write to us listing the numbers, month and name of magazine, and mail with your name and address to Inquiry Dept., Roads and Streets, 22 W. Maple St., Chicago 10, U.S.A.

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by the grid which then activates sensitive selsyn units. The selsyns in turn activate varying-speed reversible servo-motors which raise or lower the screed arms the correct distance to increase or decrease mat thickness. When laying surface course, the grid can be replaced by a shoe which rides on an adjacent mat.

The brain behind the system is the control box. Electrical in-puts from the command panel, pendulum and sensor are fed into this box; the out-put operates the servo-motors which control the screed arms. Through a scissors like linkage, the arm movement tilts the screed up and down to shift the attack angle. This actuator motion is completely independent of crawler motion or road surface. Whether the crawlers hit a depression or a hump, the string reference line, sensor grid and screed remain in the same position. The Electromatic Screed Controller automatically compensates for the difference between the desired grade and slope and the existing subgrade.

In addition to undergoing extensive tests on city streets and county highways, the Electromatic Screed Controller has been rigorously checked out on a large Iowa project by Highway Surfacers, Inc., contractors, who needed 25 trucks from three hot-mix plants for the 600-ton laydown pace of the new paver.

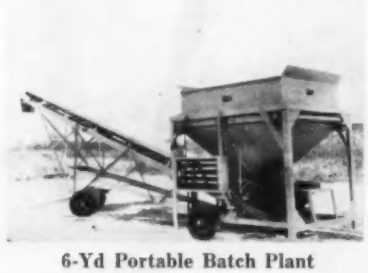
**Iowa Manufacturing Co., Cedar Rapids, Iowa**

For more details circle 101 on Enclosed Return Postal Card.

## Portable Batch Plant

A new 6-yd. Portable batch plant that is made of Man Ten abrasion resistant steel has been introduced by Aersoil Products Co., Inc.

The unit has a beam scale as standard equipment but can be equipped with dial scale if desired. A 24-in. x 40-in.



**6-Yd Portable Batch Plant**

belt conveyor is standard equipment complete with a belt wiper and discharge hood. The conveyor is driven by a gas engine.

**Aeroil Products Company, Inc., South Hackensack, New Jersey**

For more details circle 102 on Enclosed Return Postal Card.

## Safety Hats

An industrial safety hat that is injection molded with polycarbonate has been announced by the Mine Safety Appliance Company.

Polycarbonate is a thermoplastic material. The new hat is designed with a single ridge construction that complies with Federal Specifications of the American Standards Association. The product is resistant to chemicals, acids and alkalies. It features retention of

**Polycarbonate Molded Safety Hat**

flexural strength and rigidity at low and high temperatures. It has a fixed crown suspension with a double cradle design. Its critical crown clearance, at least 1¼-in., is reportedly tamper proof.

**Mine Safety Appliance Co., c/o Ketchum, MacLeod & Grove, Inc., Four Gateway Center, Pittsburgh 22, Pa.**

For more details circle 103 on Enclosed Return Postal Card.

## New Loader and Hydro-Trencher

New matched equipment for the Oliver 550 tractor has been made available by the Ware Machine Works.

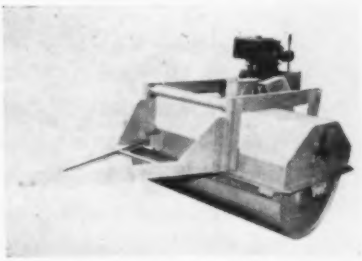
The 561 Industrial Loader is of Hi-Tensile alloy steel box section construction and features a 60-in bucket with 54-deg. break-out. Other features of the loader are a 7200-lb. breakout capacity, patented automatic bucket leveling with a close up carry position, a rated lift of 3800-lb. to full height. The Model 400 Hydro-Trencher is specifically matched for operation in combination with the 561 loader. It features a quick detach system, a digging reach of 18-ft. 4½-in. from center line of rear axle, bucket breakout capacity of 10,500-lb., a digging depth of 12-ft. 3½-in., 180-deg. uninterrupted swing, lifts to 5400-lb. at 5-ft radius and individual stabilizers and greater operator visibility.

**Ware Machine Works, Ware, Mass.**

For more details circle 104 on Enclosed Return Postal Card.

## Vibrating Roller

The VP-2G Vibra-Pactor, a variable-frequency vibrating roller designed to meet requirements of from 1500 to



**Bros Vibrating Roller**

4000 vibration per min., has been announced by Bros, Inc.

The vibrating mechanism consists of four synchronized eccentric weights which are timed with hardened gears and fully enclosed in an oil-tight case. The unit is powered by a 7 hp engine and delivers a maximum applied force of 4950-lb. at 4000 vibration per min. The overall width of the machine is 68¼-in and length with tongue is 94-in. Tongue can be adjusted to any height from 16½ to 35-in. above the ground.

**Bros, Inc., 1057 Tenth Ave., S. E., Minneapolis 14, Minn.**

For more details circle 105 on Enclosed Return Postal Card.

## Range Light

The FA-240 Range Light, constructed of heavy, reinforced, molded fiber glass with stainless steel hardware, has been announced by Wallace & Tiernan, Inc.

It is of watertight construction and has a four or eight-place lampchanger. A short filament, and 6-volt lamps reportedly gives high beam candlepower.

**The Range Light**

It has an optional sun switch. The lamp has V-type aiming sights, and leveling and aligning adjustments in the base.

**Wallace & Tiernan, Inc., 25 Main St., Belleville 9, N. J.**

For more details circle 106 on Enclosed Return Postal Card.

Be kind to taxpayers. Reinforce

Civic pride. Driving comfort. Taxpayer satisfaction. All are reasons for making sure that your urban redevelopment plans start with smooth, long-lasting streets. Take a tip from the concrete toll roads in service today: over 95% are reinforced with welded wire fabric.

It's good business to build streets that last. First, if Federal or State aid pays initial cost, maintenance costs are up to you. Second, tax dollars don't stretch very far if maintenance costs are excessive. Third, maintenance costs are high unless you reinforce your pavement the most economical way: with USS American Welded Wire Fabric.

USS American Welded Wire Fabric delivers the tensile strength needed to control cracks due to variations in temperature, moisture, soil shifting and traffic loads. It distributes balanced design that protects edges and corners. By actual measurement, welded wire fabric's ability to control cracks adds 30% to the strength of the slab.

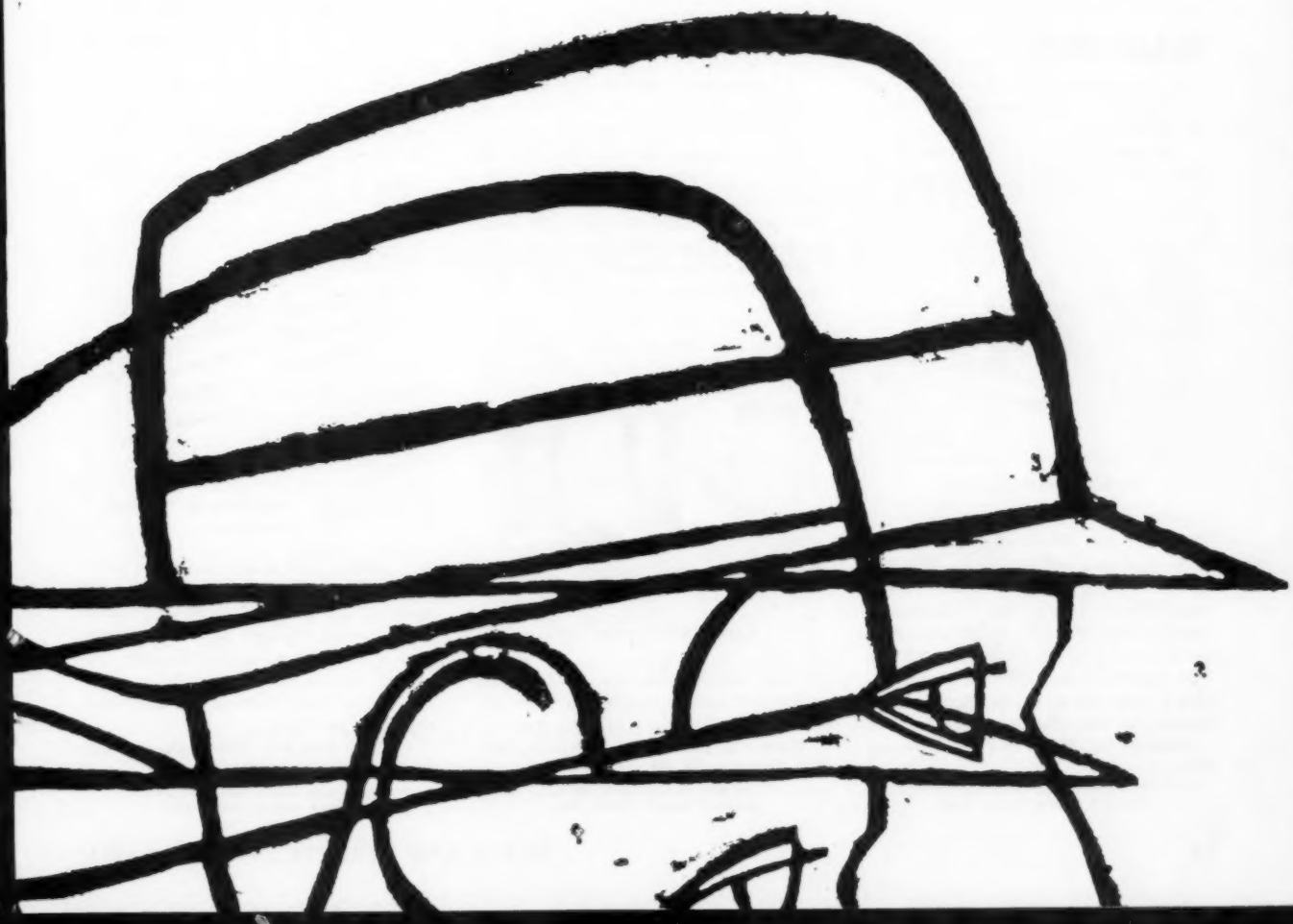
USS American Welded Wire Fabric is precision-made of cold-drawn, 60,000 psi min. yield strength wire, sized to your exact requirements, ready for immediate placement. For full information, write American Steel and Wire, Dept. 1290, Rockefeller Building, Cleveland 13, Ohio.

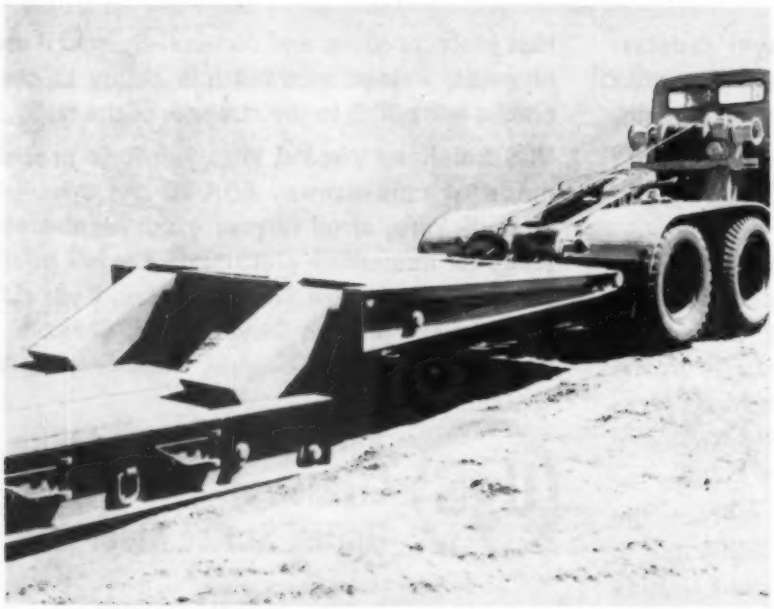
*USS and American are registered trademarks* **Innovators in Wire**

**American Steel and Wire Division of United States Steel**

Columbia-Geneva Steel Division, San Francisco
Tennessee Coal and Iron Division, Fairfield, Ala.
United States Steel Export Company

# America's new city streets with welded wire fabric.





Weight of Martin Folding Gooseneck trailers has been reduced by 250 to 300-lbs. by fabricating gooseneck linkage of lightweight "T-1" steel. The feature is now standard on all the makers trailers of 15 through 35 tons. The Folding Gooseneck lowers into a broad, stable ramp for fast, safe loading and unloading of heavy equipment.

**Hyster Co., Tractor Equipment Div., P. O. Box 328, Peoria, Ill.**

For more details circle 107 on Enclosed Return Postal Card.

## Safety Nets

The Safe-Hi safety net designed by Rose Manufacturing Co. has been made available for adaptation to the special requirements of any construction or maintenance job.

The net is constructed of 1-in. woven DuPont nylon webbing that has a tensile strength of 3000-lb. It is double stitched on 6-in. centers, with nylon thread. The standard nets have 1¾-in. nylon tie straps every two feet, around the perimeter. Tie straps will stand 3000-lb. of loading. Hardware on the nets is plated and has 5000-lb. minimum strength. A dee ring of drop forged, heat treated alloy steel attaches the snap to the net. The net is attached by passing tie strap around the beam and snapping it back into the dee ring. Standard nets are 22-ft. square. Any length or width may be attained by joining sections together.

**Rose Manufacturing Company, 2700 W. Barberry Pl., Denver 4, Colo.**

For more details circle 110 on Enclosed Return Postal Card.

## Backfill Blade

A new backfill blade for their Model 77 Trenchliner has been announced by the Parsons Co.

The new blade is 60-in. wide, 25-in. high, and is double acting through hydraulic cylinders. In raised position, the blade has 12-in. of ground clearance. It is attached with four pins; two in the crawler frame and two in the main frame. It also has a removable cutting edge of ½-in. thick steel connected to the blade with seven blades. The blade can be used for small backfilling jobs and to grade ahead of the tractor, the manufacturer states.

**Parsons Backfill Blade**

**Parsons Co., P. O. Box 431, Newton, Iowa**

For more details circle 108 on Enclosed Return Postal Card.

## Permanent Cylinder Mold

A lightweight concrete cylinder mold of three piece construction has been announced by Forney's Inc.

The baseplate is iron, and the two halves of the form comprising the barrel are aluminum alloy. The weight of the complete mold is 13-lbs. All inside surfaces are machined, and the wall thickness is such that re-machining is possible without a dimensional increase beyond specification limits. The swing bolts have a cam action which forces the two halves apart for specimen removal.

**Forney's Cylinder Mold**

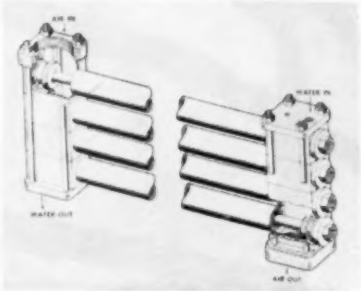
**Forney's, Inc., Tester Division, Box 310, New Castle, Pa.**

For more details circle 109 on Enclosed Return Postal Card.

## Aftercooler Cylinders

An aftercooler with matching heads and tubes that can be vertically stacked to match any compressor size has been introduced by Le Roi. The manufacturer reports that extra tubes can be added to increase cooling capacity on all aftercoolers produced in the series.

The aftercooler is installed in the line between the compressor outlet and air receiver. The flow of air and water within the compressor is in opposite directions assuring maximum absorption of heat. The aftercooler tubes carry two gallons of water per minute. By stacking more cylinders in a vertical stack cooling capacity increases. Aftercoolers are rated with air flows from 100 to 500 cfm at inlet temperatures from 200° to 500° and water flow from two to eight gal. per min.



**Aftercooler Cylinders in Stacked Position**

**Le Roi Division, Westinghouse Air Brake Co., Sidney, Ohio**

For more details circle 111 on Enclosed Return Postal Card.

*This 20-ft. wide Danville, Vt., road was paved with 6-in. soil-cement containing 9% cement mixed with in-place materials.*

*At Danville, Vermont...*

# 7-year test proves soil-cement pavement is economical to build and maintain

This farm-to-market road used to be impassable every spring. Not any more. In 1953, the Vermont State Department of Highways, in co-operation with the town of Danville, started tests to determine an answer to this problem. Two 1,500-ft. test strips of the road were paved. One was of gravel base and asphalt surface. The other was soil-cement base and asphalt seal coat.

Compared to the gravel base test strip, the soil-cement test pavement showed an impressive saving in initial cost because it used materials on the site. And a continuing 7-year check proved that the soil-cement pavement required no maintenance except for a seal coat. On this basis, the full 3.8 miles of road were paved with soil-cement in 1960.

It's easy to see why soil-cement pavement costs less to lay, less to maintain. Most of the materials cost nothing. The main ingredient is soil at the site—even broken-up blacktop or gravel. Mixed with portland cement and water, rolled and topped with bituminous coating—the pavement's finished. Soil-cement roads stay rigid; don't pothole or wash out at the edges; save tax money, too, because of low maintenance. They stretch road budgets and let engineers plan ahead. Write for free soil-cement facts. (U.S. and Canada only.)

**Gets stronger with age.** Cores cut from soil-cement roads and streets show strength gains right from the start.

**PORTLAND CEMENT ASSOCIATION**

**Dept. A11-28, 33 W. Grand Ave., Chicago 10, Ill.**

*A national organization to improve and extend the uses of portland cement and concrete*

## Tractor Engine

A 170 hp GM diesel engine, the Model 6V-53, is now available as optional equipment for the "Michigan" Model 180 Tractor Dozer manufac-

**Clark's Tractor Dozer**

tured by the Clark Equipment Co.

Designed to increase the tractor dozer's flexibility and production, the new engine features two-stroke engine cycle, unit injector fuel system and maximum parts interchangeability. The tractor as a top speed of 27 mph in forward or reverse. The drive line consists of a three to one multiplication factor torque converter, four-speed power shift and all-wheel drive. It has rearwheel steering and front axle with locking type differential. Dozer blade action is hydraulically controlled through lift, pitch and tilt cylinders.

**Construction Machinery Division, Clark Equipment Co., Pipestone Plant, Benton Harbor, Mich.**

For more details circle 112 on Enclosed Return Postal Card.

## Rail and Road Truck

A 4-wheel drive pickup truck especially equipped to ride on top of railroad tracks has been produced by GMC Truck and Coach Division.

The trucks are the model K1500 built by GMC. Other concerns enlarged the cabs to accommodate six persons and equipped the truck with Hi-Rail devices. Each truck has two retractable rail wheels at each end. When lowered, they hold the truck on the track so it can proceed on its regular wheels. The special rail wheels are raised when the

**The Road and Rail Truck**

truck leaves the track. The trucks can also be equipped with snowplows to keep station platforms, driveways and road crossings clear in winter months.

**GMC Truck & Coach Division, GMC Corp., 660 S. Boulevard East, Pontiac 11, Mich.**

For more details circle 113 on Enclosed Return Postal Card.

## 10,000-Lb. Batch Plant

A new 10,000-lb. batch capacity asphalt plant has been introduced by Baldwin-Lima-Hamilton Corp.

The plant, tradenamed the Lima Madsen Model 581, is rated at 300 tons per hr. at a 60-sec. charge-mix-discharge cycle. It is available for cold aggregate feed, dryer burner firing and tower batching. It has four or five compartment bins with up to 100-ton storage

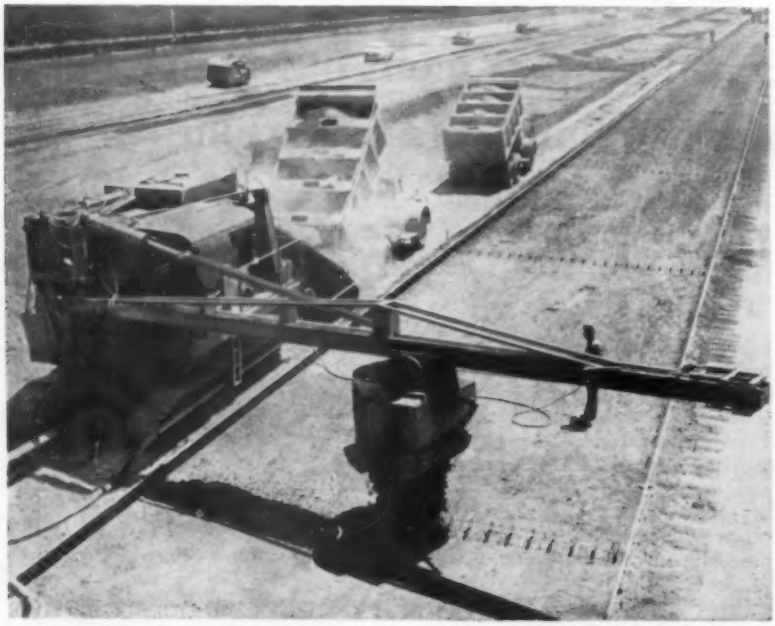
**New Lima Madsen Batch Plant**

capacity for hot aggregates. Weigh box has a capacity of 217 cu. ft. level full and a working capacity of 100 cu. ft Mixer gross cubic footage is 163-ft. Dust is collected by a cyclone type dry collector. Horizontal double deck vibrating screen with added split deck has 200 sq. ft. of actual screening area.

Dryer has separate power unit and is constructed with patented Perfo-Divided-Lifters for delayed discharge of material to opposite side of dryer.

**Baldwin-Lima-Hamilton Corp., Construction Equip. Div., Lima, Ohio**

For more details circle 114 on Enclosed Return Postal Card.



Shown in the picture is a new Koehring Tribatch Paver pouring a bucket load of concrete onto the subgrade of Interstate Highway #1-29, near Elk Point, South Dakota.

## Road & Rail Carrier

A newly designed road and rail crane carrier that features hydraulic operation has been announced by Crane Carrier Corp.

The carrier, called Model 1566, is equipped with hydraulically operated rail guide wheels for operation on railroad tracks. The rail wheels are retract-

**Road & Rail Carrier**

able permitting the carrier to be driven on highways also.

**Crane Carrier Industries, Inc., Tulsa, Okla.**

For more details circle 115 on Enclosed Return Postal Card.

## Truck Safety Alarm

A motion-activated mechanical safety bell which can be locked to ring in either forward or reverse, or both directions, and which can be adjusted for volume, frequency and regularity of

**Warn Safety Alarm**

signal is now being marketed by Warn Sales Co.

The new alarm, Model 561, is designed for use on fork lift trucks and street or highway vehicles operating under nominal noise levels. Decibel volume is adjustable.

**Warn Sales Co., Riverton Box 6132, Seattle 88, Wash.**

For more details circle 116 on Enclosed Return Postal Card.

## Emalfon Glove

Research has developed a new use for the Emalfon glove that was originally introduced as a protection against hot jobs that did not exceed 700-deg. F. by Singer Glove Mfg. Co.

The glove is being used on sub-zero cold jobs and for protection against

**Emalfon Glove**

frigid burns. The glove is made in a combination of three layers: terry-cloth outside; all-wool in the middle; fleeced cotton inside. It comes in 12 and 23-in. lengths.

**Singer Glove Mfg. Co., 860 W. Weed St., Chicago 22, Ill.**

For more details circle 117 on Enclosed Return Postal Card.


EIMCO®

challenges

comparison

Before you buy any crawler loader or dozer, make your own comparison. Check the features and operation of the Eimco tractor of your choice against any comparable sized equipment. If you do . . . you'll buy Eimco!

Only from Eimco do you get, as standard equipment, simple lever automatic directional and speed shifting; "Unidrive" Power-Shift transmission, single stage industrial torque converter, dual final drives.

These result in unmatched dependability and maneuverability, including true spin turns on the tractors own length!

You get, with any front end loader from Eimco, higher lift and longer reach for easier loading; heavier arms, cylinders, pins and bushings.

Eimco quality engineering and construction permits a written one-year manufacturer's warranty on every Eimco tractor and transmission.

From 107 to 225 HP diesel, there's an Eimco to fit your needs!

TRACTORS • BULLDOZERS

FRONT END LOADERS

LOG LOADERS • EXCAVATORS

SPECIAL STEEL MILL LOADERS

EIMCO

"Advanced Engineering and Quality Craftsmanship Since 1884"

B-810

Write The Eimco Corporation, Salt Lake City 10, Utah, U.S.A. for the address of the Eimco dealer or branch nearest you and for Bulletin LS-1167.

. . . for more details circle 299 on enclosed return postal card

## Forced Feed Conveyor Loader

Made to operate from the M-F Utility 65 Tractor, an elevating forced feed conveyor loader that is designed for work in stock-pile loading, windrow pickup, scarifying and stripping, and pit and bank loading, has been announced by Massey-Ferguson.

Hydraulic controls are in the operators cab to raise and lower the moldboard, to raise for operating and lower for transporting of conveyor, and to control hydraulic motor for tractor drive, either forward or backward. The conveyor is 30-in. wide and is equipped with heavy ply rubber belting. It attains a speed of 500 ft. per min. Engine speed is 1,500 rpm. Capacity is 5 to 8 cu. yd. a min. in loose material and 20 cu. yd. per min. in snow. Over-all length is 25-feet; width, 7,-ft.; operating height, 11-ft.; transporting height, 8-ft.; discharging height, 10-ft. The feeder blades are cupped curved, 33-in. long and 6-in. high, and are made of 3/8-in. carbon steel.

The feeder, designed to allow for rising and falling with the contour of

**M-F Utility 65 Tractor w/Forced Feed Conveyor Loader**

the windrow or stockpile, is made up of feeder blades and end augurs. Augurs move material from the front and sides into the feeder blades.

**Massey-Ferguson Industrial Division, Block 1000 S.W. St., Wichita, Kansas**

For more details circle 118 on Enclosed Return Postal Card.

## Blasting Powder

A high-density blasting agent that reportedly obtains a high velocity has been announced by Austin Powder Co.

The product, called Austinite 30, possesses a density of 1.2 and a speed of 14,000-ft. per sec. Priming the blasting agent can be accomplished by the use of Austin ACP primers or regular dynamites and gelatins. The material is offered in spiral wrapped fiber containers 4½ x 9-in. in diameter.

**Austin Powder Co., Cleveland 13, Ohio**

For more details circle 119 on Enclosed Return Postal Card.

## Concrete-Asphalt Saw

A concrete-asphalt saw, the Model SB-12, has been added to the line of the Equipment Development Co., Inc.

**The EDCO Concrete-Asphalt Saw**

The unit is designed to meet the need for short run cuts in concrete and asphalt. It is available with either a 7 hp gasoline, or a 3 hp electric motor. It utilizes a ¾-in. arbor making the saw usable with portable saw abrasive blades, and standard concrete and asphalt blades from 6 to 12-in. in diameter. The unit weighs less than 200-lb.

**Equipment Development Company, Inc., 2700 Garfield Ave., Silver Springs, Md.**

For more details circle 120 on Enclosed Return Postal Card.

## Materials Sample Splitter

A stainless steel sample splitter for dividing or halving dry materials such as soil, sand, cement, gravel and coal has been developed by Soiltest, Inc.

Materials poured into the hopper are automatically divided into two equal portions by a series of chutes. The chutes discharge the material alter-

**Soiltest Sample Splitter**

nately in opposite directions into separate pans. It is available in five chute widths and comes with a scoop and brush.

**Soiltest, Inc., 4711 W. North Ave., Chicago 39, Ill.**

For more details circle 121 on Enclosed Return Postal Card.

## New Dodge Trucks

The 1962 line of Dodge trucks has been announced. The line has 141 basic models, including conventional-cab, LCF, forward-control chassis, 4-wheel drive, school bus chassis and tandem units.

A half-ton forward-control delivery unit provides a short turning radius. A 104-in. wheelbase and a maximum gross vehicle weight rating of 5,100-lbs. is available with either of the manufacturer's Inclined 6-cylinder gasoline engines. Eleven gasoline engines, ranging from 101 to 228 hp are offered. Four 6-cylinder engines are available with hp ratings from 101 to 140. According to the manufacturer, the Inclined engine design makes it possible for engineers to maintain a low hood height and pro-

**Dodge KCT-900 Truck**

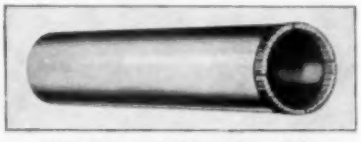
vide maximum accessibility into the engine compartment. A closed crankcase ventilating system is standard on all 8-cylinder, 4-wheel-drive models.

**Dodge Public Relations, 7900 Joseph Campau, Detroit 31, Mich.**

For more details circle 122 on Enclosed Return Postal Card.

## Throw-A-Way Core Bits

A surface set throw-a-way core bit, manufactured with Grade A diamonds,



**The Throw-A-Way Core Bit**

random set and in a non-spiral pattern has been introduced to the line of Clipper Mfg. Co.

The new bit features specially designed core barrels that reportedly result in reducing barrel rupture and bit failure. The bits are not resettable.

**Clipper Manufacturing Company, Suite 191, 2800 Warwick, Kansas City, Missouri**

For more details circle 123 on Enclosed Return Postal Card.

# ALPHA news and notes from the field

BETTER CONSTRUCTION THROUGH BETTER USE OF CEMENTS

## Some Basic Facts About High-Early Strength Concrete

### What It Is

The simplest explanation of what is generally called "high-early strength" in concrete is a comparison of the strength of concrete made with Hi-Early (Type III) cement to that of concrete made with Regular (Type I) cement. Approximate relative strengths are shown in the table below. One point that should be kept in mind in such a comparison is that *compressive strength is not always the best measurement of concrete quality*. For instance, the highest strength concrete is not always the most durable. Many other factors also have to be considered although strength is the most commonly used yardstick for job-site quality control.

**Relative Strengths of Concrete Made From Hi-Early (Type III) and Regular (Type I) Cements**

| | Compressive Strength | |
|---|---|---|
| | 3 Days | 28 Days |
| Regular Cement (Type I) | 100% | 100% |
| Hi-Early Strength Cement (Type III) | 190% | 130% |

(Above comparisons do not apply when steam curing is employed)

Tabulation courtesy of "Guide to Better Field Practice", Concrete Construction.

In this tabulation the strength of concrete made with Regular (Type I) cement was used as 100%. It can easily be seen how concrete made with Hi-Early cement gains strength rapidly in the early stages, and how this advantage wanes in the later stages.

### When to Use High-Early Strength Concrete

This decision is usually made on the basis of economics. High-early strength concrete is generally used where high strengths at early ages are necessary. Since the production of high-early strength concrete is more expensive, its convenience must offset the additional cost. The factors that determine whether high-early strength concrete is needed or desirable are usually early stripping of forms, early *use* of concrete such as heavily traveled pavements or floors and the necessity for shorter curing periods during cold weather to develop strength to resist freezing at early ages. High-early strength concrete can be produced by using Hi-Early cement or by increasing the cement factor if regular cement is used—more about this later.

For emergency jobs to provide fewer interruptions during remodeling or repairs, high-early strength concrete is often specified.

Earlier form removal is one advantage of using high-early strength concrete.

### Why Hi-Early Cement Costs More

Two of the most expensive operations in the production of cement are the burning and preparation of clinker and the grinding of the clinker into finished cement. Both of these operations are more expensive in the production of Hi-Early cement plus additional costs in changing raw material proportions and raw material preparation. These factors account for the increased production costs of Hi-Early cement and its higher price.

When low temperatures are expected at early ages, high-early strength concrete shortens the period of curing and possible freezing damage.

### Is Hi-Early Cement Necessary to Get High-Early Strength Concrete?

When a limited amount of high-early strength concrete is needed, it may prove expensive for a concrete producer to stock Hi-Early (Type III) cement for the job. In such a case, he might consider using larger quantities of Regular (Type I) cement to obtain the necessary early strength.

In this event, advance tests of the materials to be used in the job should be made to determine how much cement per yard will be required. To give approximations of what to expect, Alpha's research men did some preliminary testing for comparison. (Several brands of cement were used.) These are the "rules of thumb" resulting from the tests:

1. In general, the strength of relatively *lean* 5 sacks per yard Type III cement concrete can be duplicated at *1 and 3* days by using Type I cement if the cement factor is increased 2 sacks per yard to a 7-sack mix.
2. The strength of *richer*—6 sacks or more—Type III cement mixes can be duplicated at *1 and 3* days with Type I cement by increasing the cement factor by about 2½ sacks per yard to an 8½-sack mix.
3. At 7 days, the strength advantage of Type III concrete becomes less than at earlier ages. To maintain equal strengths of the concrete at 7 days, the cement factor for Type I cement would have to be increased by about 1½ sacks per yard over that of Type III cement.

It can thus be seen that it is easier to duplicate Hi-Early cement concrete strength at 7 days than at the earlier 1 and 3 days.

**When Hi-Early cement is used for concrete products (block, precast beams, etc.) there are many other variables to be considered such as aggregates, steam curing and others. Alpha Field Engineers are equipped and ready to help users of our cements achieve maximum efficiency from any application of portland cements.**

ALPHA
PORTLAND CEMENT COMPANY
Alpha Building, Easton, Pa.

. . . for more details circle 276 on enclosed return postal card

## Unit Loader

A 1-yd. unit loader, the W-5, that reportedly is capable of shifting from any forward speed to a 28 percent faster reverse speed without clutching or shifting, has been introduced by J. I. Case.

Case W-5 Loader

The new unit is equipped with a 188 cu. in. gasoline engine that develops 57 gross hp. Carry capacity is 5000-lb. The design of the lifting arms, bucket and hydraulic system provide a 7,800-lb. breakout power at ground level. The bucket is self-leveling. Lift arms never rise above the operator's station.

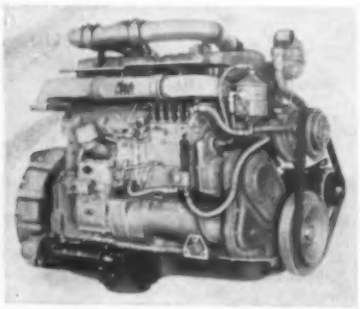
**J. I. Case Co., Racine, Wisc.**

For more details circle 124 on Enclosed Return Postal Card.

## New Diesel Engine

A new and more powerful version of its naturally-aspirated Thermodyne diesel engine has been announced available by Mack Trucks, Inc. The new engine has been named the PowerRam Thermodyne.

According to the manufacturer, a new air intake principle which increases volumetric efficiency by a full 10 percent has increased the hp of the engine to 180 hp at 2100 rpm. This new system increases the air intake valve pressure by a pulse or ram principle which improves the breathing capacity of the engine. A new combination full-flow/by-pass lubricating oil filter, incorporating both filters in one shell, has a capacity of 16 quarts.



Macks' PowerRam Diesel

**Mack Trucks, Inc., Plainfield, N. J.**

For more details circle 125 on Enclosed Return Postal Card.

## Engineer's Transit

The development of a compact, fully enclosed engineers transit, designated the No. 6140 Top-Site, has been introduced by the Eugene Dietzgen Co.

The dust-proof surveying instrument incorporates an antireflective, prismatic erecting system utilizing a 7-in. telescope. The magnification of the Transit is 25X. Its focusing knob is side-mounted, and is calibrated to show approximate focusing distances. It is also equipped with a dioptric ring for individual focusing. The instrument features, too, a built-in optical plummet that rotates with the instrument for accurate positioning. It weighs 10-lbs.

Top-Site Engineer's Transit

**Eugene Dietzgen Co., 2425 N. Sheffield Ave., Chicago 14, Ill.**

For more details circle 126 on Enclosed Return Postal Card.

## Conveyor Automation System

A new automated system of conveyor material handling has been announced by Engineered Equipment, Inc.

The system reportedly allows the delivering truck driver or the batching plant operator to route the material to the proper bin compartment by means of sensing devices along the conveyor belt. The operator, in this way, can monitor the flow of material. Alarm sensors automatically shut down the conveyor system when anything disrupts the normal operation. The bin signals prevent over-filling the bin compartments. Another feature is a self-controlling hopper gate which automatically regulates itself for different materials.

**Engineered Equipment, Inc., Waterloo, Iowa**

For more details circle 127 on Enclosed Return Postal Card.

## Scraper Blade Attachment

A full-width scraper blade to be mounted beneath the bed of the Warner & Swasey Gradall has been announced as a new attachment by the company.

Gradall Scraper Attachment

The scraper blade is hydraulically controlled from the cab and can be angled to throw the dirt aside as the machine is driven along. The blade is said to be readily adaptable to road shoulder work and for removing snow and ice.

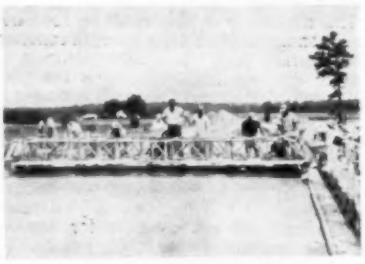
**Warner & Swasey Co., 323 Republic Bldg., Cleveland 15, Ohio**

For more details circle 128 on Enclosed Return Postal Card.

## Concrete Finisher

A concrete finisher that was originally developed for use as a bridge deck finisher has been adapted to handle small paving jobs by Engineered Equipment, Inc.

The finisher utilizes dual oscillating screeds which reportedly minimize side movement of the machine. Finishing tolerances can be held within 1/8-in. in 10-ft. The unit is gas driven and can be made to span any width from 12 to 44-ft. It is available with self-propulsion or hand-powered winches. It is adjustable to truss lengths, and individual screeds can be inserted to meet any requirements.



The True-Line Finisher

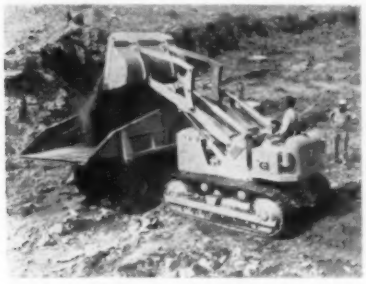
**Engineered Equipment, Inc., Waterloo, Iowa**

For more details circle 129 on Enclosed Return Postal Card.

## Tractor Shovel

A new 1¾-cu. yd. capacity tractor shovel, the HD-7G, has full hydraulic power steering and oil-cooled power brakes according to the manufacturer, the Allis-Chalmers Mfr. Co.

The unit is powered by a 100-hp A-C turbo-charged diesel engine, and has a



A-C's Tractor Shovel

torque converter combined with a single lever power shift transmission featuring the maker's Ground Speed Control governor. Power steering, clutches and brakes, are added features designed to reduce brake adjustments and provide self-adjusting clutches. The machine has 7-ft. 1⅝-in. of track on the ground, 62-in. wide tread, and 15-in. standard shoes.

**Allis-Chalmers Mfr. Co., Machinery Construction Div., Milwaukee 1, Wisc.**

For more details circle 130 on Enclosed Return Postal Card.

## Pavement Breaker

A pavement breaker, called the Woodpecker because of its long-neck, and big-headed cutting action, has been announced by the RPB Corp.

The machine is completely hydraulic. It has no compressor or hose, and is able to move under its own power at speeds up to 55 mph. One man operates this unit that has a controlled blow with impact up to 500,000 lbs.

RPB Pavement Cutter

Creeper speed is 14-ft. per min. The head is bored to fit a number of specified tools. It tamps top lift in trenches to specified densities to a depth of 4-ft.

**RPB Corp., 2751 E. 11th St., Los Angeles 23, Calif.**

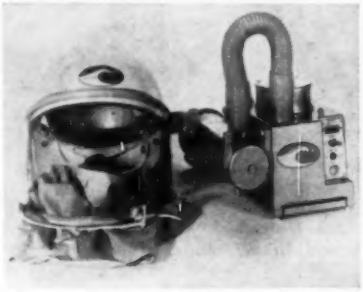
For more details circle 131 on Enclosed Return Postal Card.

## Health Protection

A new health protection system for earth-moving equipment operators and others in the construction business has been introduced by Jamison Laboratories.

The system, known as the Whitecap Model CU-1, is designed to protect the head, eyes, ears, nose, throat, neck, face and entire respiratory system. Air enters the primary screen which takes out all large particles and then is taken through the centrifugal filter/blower which discharges other particulant matter. Air then passes through an additional fine particle filter which removes particles to one micron. A hose, insulated, delivers the processed air to the helmet, which is constructed of double-shell fibreglass.

Inlet air is ducted between the two shells and through peripheral holes in the inner shell. The helmet face plate



Whitecap Model CU-1

does not limit normal peripheral vision and can be raised and lowered. The system has a quick disconnect feature whereby a sudden tug in any direction will free the operator. Chin cup and head are adjustable for individual fit.

**Jamieson Laboratories, 7900 Haskell Ave., Van Nuys, Calif.**

For more details circle 132 on Enclosed Return Postal Card.

## Cold Water Cleaner

A new cold water cleaner, declared useful for removal of greases, gums and oils, has been introduced by Davis Emergency Equipment Co.

Called PC-5, the cleaner is non-toxic upon inhalation, gives off no odor, is harmless to skin and clothing, and is non-inflammable. It will not affect painted surfaces, and contains an anti-oxidant for protection of metal. It is a concentrate designed to be cut 10 parts water to one part chemical for normal cleaning operatings, and is equally effective when diluted with fresh or salt water.

**Davis Emergency Equipment Co., 45 Halleck St., Newark 4, N. J.**

For more details circle 133 on Enclosed Return Postal Card.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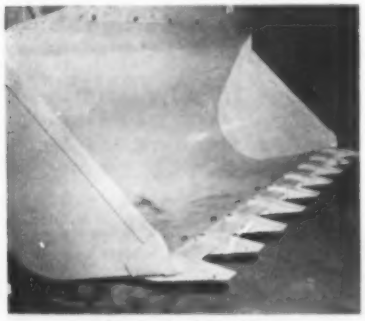
. . . for more details circle 312 on enclosed return postal card

## Bucket Teeth Tips

New tips for the bucket teeth of the three Caterpillar track-type loaders and the two larger wheel-type loaders has



"Runner" Type Tips

been announced by the Caterpillar Tractor Co.

Longer in length, the new tips are two designs. The "runner" type is for use with wheel loaders. The digger type for track type machines used for excavation work. Both types are flat on one side and ribbed on the other. "Runner" tips are mounted on the bucket rib side up; on the digger type the rib side is down.

**Caterpillar Tractor Co., Peoria, Ill.**

For more details circle 134 on Enclosed Return Postal Card.

## Compressor/Tractor

A new multi-use compressor/tractor, the Series 62 Heavy Pneumatractor, has been introduced by Schramm, Inc.

The unit basically is a self-propelled 125 cfm air compressor but is capable of mounting a variety of accessories

Schramm's Pneumatractor

from a backhoe to snow plow to aerial tower. The compressor features a development called controlled delivery which permits selection of 42, 84, or 125 cfm capacity as required making it possible to operate pneumatic tools at the same time the accessory is being used. The backhoe accessory excavates to a depth of 12-ft. 8-in. with 12, 18, 24, or 36-in. buckets and starts digging 20-ft. 7-in. from rear axle.

**Schramm, Inc., 900 E. Virginia Ave., West Chester, Pa.**

For more details circle 135 on Enclosed Return Postal Card.

## Hydraulic Winch

A new, completely hydraulic winch, the Model 10 Pippin, that is capable of more than 17,000-lbs. line pull has been introduced by the Windsor Pippin Corp.

The winch is constructed of fabricated steel and fits all tractors. No power take-off is required, and it may also be powered by an electric motor-driven hydraulic pump. The cable drum is powered by two hydraulic cylinders, each with cast iron pistons and

Pippin Hydraulic Winch

rings. It has no flexible packings, clutch bands, brake bands, or gears and reportedly operates without slipping or jerking.

**Windsor Pippin Corp., Windsor, Vermont**

For more details circle 136 on Enclosed Return Postal Card.

## Rear Dump Trailer

A trailer that reportedly boosts payload to 27-ton capacity and is designed to work with the new Cat diesel tractor, forming a complete unit, has been introduced by Athey Products Corp.

The unit is constructed of high-strength steel throughout, has an open-

Athey's Dump Trailer

mouthed body design, and power shift transmission.

**Athey Products Corp., 5631 W. 65th St., Chicago 38, Ill.**

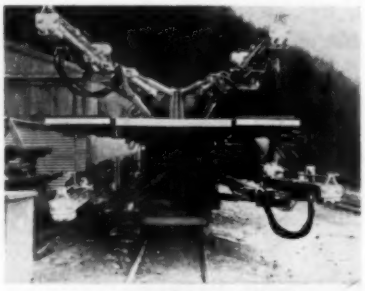
For more details circle 137 on Enclosed Return Postal Card.

## Rock Drill

A new rock drill that reportedly combines the features of rotary and percussion drilling has been introduced by the Joy Manufacturing Co.

Known as the Rotary Percussion Drill, it is designed to penetrate most rock formations with additional speed, and is best suited for tunneling and underground mining operations. Rotary cutting is provided by an independent rotation system which applies high torque to the bit through a variable speed hydraulic motor and gear reduction. The drill is mounted on a heavy-duty chain feed with a hydraulic motor which applies high feed pressure on the bit.

The drill simultaneously combines rotary milling with percussion hammering. It uses either water or air to flush cutting from the hole about half of the air required for a comparable 3½-in. percussion drill. The reduced air requirements eliminate to some degree



The Joy RPD Rock Drill

fogging at the drilling face. The wet machine also eliminates the danger of silicosis because it uses water exclusively to clean holes and eliminate air-borne rock dust.

**Joy Manufacturing Co., Oliver Bldg., Pittsburgh 22, Pa.**

For more details circle 138 on Enclosed Return Postal Card.

## Ice Melter

A new chemical ice melter reportedly effective at all winter temperatures has been introduced by Chem Industrial Co.

Tradenamed Melt, the product is composed of a blend of 2 different types of temperature-rated ice-melting chemicals. In the manufacturing process these are extruded together in flat segments, ranging from minute sizes to discs 1/32 in. in diameter. It can be applied by hand sprinkling, shovel, mechanical power or power spreader. It is said to work equally well at 32°F. or −40°F.

**Chem Industrial Co., Brooklyn 9, Ohio**

For more details circle 139 on Enclosed Return Postal Card.

## Emergency Light

A new automatic emergency light, the Lifesaver Model 2-75, has been introduced by U-C-Lite Manufacturing Co.

Emergency Light

Designed to plug into any AC outlet and provide automatic emergency lighting, the unit operates on a standard 7½-volt dry battery. It is equipped with two 5-in. lampheads and mounting brackets welded to the battery containers. It has a built-in voltmeter and mometary contact switch for testing battery voltage.

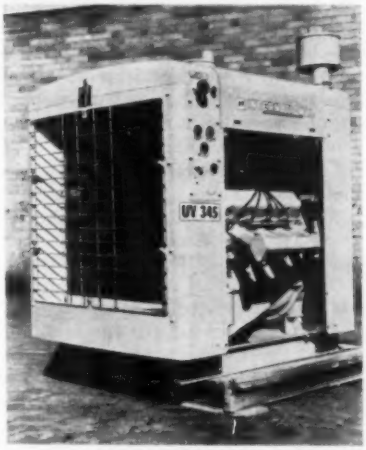
**U-C-Lite Manufacturing Co., 1050 W. Hubbard St., Chicago 22, Ill.**

For more details circle 140 on Enclosed Return Postal Card.

## New Engine

An 8-cylinder, valve-in-head engine, the UV-345, that has a stripped engine maximum hp of 194 at 3,800 rpm, industrial engine maximum hp. of 164 at 3,000 rpm and industrial engine (with fan) hp of 158 at 3,000 rpm, fueling with gasoline, has been announced as an addition to the line of International Harvester.

Features of the new engine are rigid Y block, Tocco-hardened crankshaft, aluminum alloy pistons and positive-type exhaust valve rotators. Bore and stroke are 3⅞-in. and 3 21/32-in. Piston displacement is 345 cu. in. Compression ratio is 8.05:1. Cooling capacity, including radiator, is 29 quarts and lubricating system, including filters, is 7 quarts. The engine is 39½-in. high, 33½-in. long, 38½-in. wide and weighs 740 lb.




The New IH Engine

**International Harvester Co., 180 N. Michigan Ave., Chicago 1, Ill.**

For more details circle 141 on Enclosed Return Postal Card

## Pocket Concrete Penetrometer

A pocket style concrete mortar penetrometer designed for fast evaluation of the initial set of concrete has been produced by Soiltest, Inc.

To test, the penetrometer's 1/20 sq. in. shaft is forced into the concrete mortar one inch. The resistance is shown on the direct reading scale which holds its position until released. Scale range is from 0 to 700 psi. The penetrometer can also be used on light weight concrete, special roof deck mixes and to test concrete additives.

**Soiltest, Inc., 4711 W. North Ave., Chicago 39, Ill.**

For more details circle 142 on Enclosed Return Postal Card.


This Compact FUNK Unit *SAVED* Space

On this Jaeger concrete mixer, a FUNK double right angle drive provides a perfect alignment and positive chain adjustment. Mounted vertically on the "unitized" front trunnion stand, FUNK's unit takes only a fraction of the space normally used in such applications.

It always pays to look for FUNK Modular Power Units on the equipment you buy.

**FUNK MFG. CO.** P.O. Box 577-H COFFEYVILLE, KANSAS

. . . for more details circle 293 on enclosed return postal card

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. . . for more details circle 305 on enclosed return postal card

## Guard Wire Attachment

A hydraulic guard wire attachment for the new International Superior 150-B one-man, bucket backfiller, has been introduced by International Harvester and Superior Equipment Companies.

The guard wire attachment is hydraulically controlled by two valves. One valve raises the boom, the other extends and retracts it.

**International Harvester Co., 180 N. Michigan Ave., Chicago 1, Ill.**

For more details circle 143 on Enclosed Return Postal Card.

## Vehicle For Off-Highway Service

A new 3-wheel vehicle, designed for a wide range of off-the-road towing and light hauling applications, has been introduced by Cushman Motors, a subsidiary of Outboard Marine Corp.

The Cushman Haulster

Named the Haulster, the unit is equipped with a transmission that provides a top speed of 14 mph for in-plant operation. In low gear it develops 470 lb. drawbar pull. In either of two body styles it has a payload capacity of 800 lb. The unit can operate in a 4½-ft: passageway, and has a turning radius of 90-in. 5.00 x 8, 2-ply tires on the drive wheels provide traction. A choice between 9 or 18 hp, 4-cycle die-cast aluminum engines, both of which are air-cooled is available. The transmission is controlled by a shift lever mounted on the steering column. Rear suspension is provided by a semi-elliptical spring with a torsion bar stabilizer. Front suspension is link-type with two tension springs. The vehicle has a 72-in. wheelbase, overall width of 41¾-in. and is 40-in. high.

**Cushman Motors, Lincoln, Nebraska**

For more details circle 144 on Enclosed Return Postal Card.

## Drainage Pipe

Spiral corrugated aluminum drainage pipe is now available through independent culvert dealers handling Kaiser Aluminum & Chemical Sales, Inc., the manufacturer of the new product.

Aluminum Drainage Pipe

Called Corlix, it is designed for use as underdrain and downdrain pipe in highway and general construction work. The light weight reportedly makes installation easy, and it can be cut with conventional hand tools or power tools at the job site. It is available, perforated or unperforated, in 18, 16, and 14-gauge wall thicknesses.

**Kaiser Aluminum & Chemical Corp., Kaiser Center, 300 Lakeside Dr., Oakland 12, Calif.**

For more details circle 145 on Enclosed Return Postal Card.


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TRI-KOTE is a proven cost saver that CURES, SEALS AND HARDENS concrete *in one application.* TRI-KOTE EXCEEDS ASTM 30959, AASHO, and CRD-300 specifications. Makes concrete harder . . . protects from chemicals that cause premature deterioration. Adds years of life to both new and used concrete.

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. . . for more details circle 289 on enclosed return postal card


## Asphalt Storage

While retaining the basic, patented, submerged heating principle of their model 106-o asphalt heater, the Industrial Boiler Company has improved their product so that night firing and week-end firing is eliminated.

Four new A-T models offer portability. Each unit is completely self-contained and mobile. These trailer mounted units consist of submerged hot oil heater, No. 2 fuel storage tank and completely automatic controls. The four new portable A-T models have asphalt storage ranging from 10,000 gal. to 25,000 gal. in 5,000 gal. increments.

Model 120 A-T Heater

The new A-S models are skid-mounted package units. The units feature automatic controls with modulating oil burner. Asphalt storage ranges from 10,000 gal. on the 110 A-S model to 25,000 gal. on the 125 A-S model, also in 5,000 gal. increments.

**Industrial Boiler Company, Inc., P. O. Box 9126, Chattanooga, Tenn.**

For more details circle 146 on Enclosed Return Postal Card.

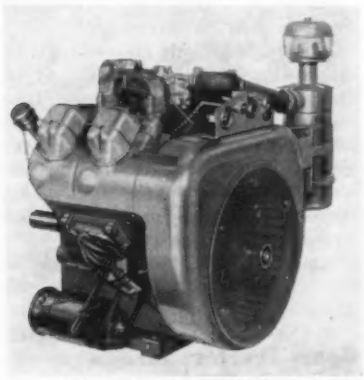
## 60-hp Engine

A new valve-in-head air-cooled V-4, 60-hp engine designed for heavy-duty applications has been announced by Wisconsin Motor Corp.

Designated the Model V-460D, the engine meets power requirements ranging from 36-hp at 1400 rpm to 60.5-hp at 3000 rpm, and develops 1650-in./lbs. torque at 1600 rpm. It has a displacement of 154 cu. in., features 7.1:1 compression ratio, and weighs 521-lbs. dry. It has a center main roller bearing and self-cleaning tapered roller end main bearings on the dynamically-balanced forged-steel crankshaft for direct-coupling of heavy loads to the shaft extension. It has a completely pressurized lubrication system and a high-temperature safety switch which shuts off the engine at a preset danger point. Cylinder-head covers house the cooling fins and protect spark plugs against dirt and condensation.

**Wisconsin Motor Corp., Milwaukee 46, Wisc.**

For more details circle 147 on Enclosed Return Postal Card.



The Valve-In-Head Engine

## Telescoping Boom

The Gradall Hydro-Scopic, a new size telescoping boom with Gradall actions, and interchangeable with Hopto 200 Hydraulic backhoes has been developed by Warner & Swasey Co.

The Hopto 200 machine is now available as a ditch cleaner with Hydro-Scopic boom attachment, or as a hydraulic backhoe with the standard backhoe. The boom unit has in and out telescoping action, 90 deg. tilt up and down, 190 deg. swing, wrist action tool control, controlled down pressure, and a reach of 14-ft. 8-in. at ground line. The Company states that the new machine was designed for alleviating drainage problems. It was made specifically for cleaning and maintenance of existing ditches or preparation of new roadside drainage ditches.

**Warner & Swasey Co., 323 Republic Bldg., Cleveland 15, Ohio**

For more details circle 148 on Enclosed Return Postal Card.

Hydro-Scopic Telescoping Boom

## Ice Melter

A new ice and snow melting compound, called Melts-It 99, and claimed to be 99 percent chemically active, has been introduced by the National Asphalt Corp.

The melter has no additives or fillers, and contains neither sodium chloride nor rock salt. It is recommended for melting ice in any location.

**National Asphalt Corp., P. O. Box 2275, Cleveland 9, Ohio**

For more details circle 149 on Enclosed Return Postal Card.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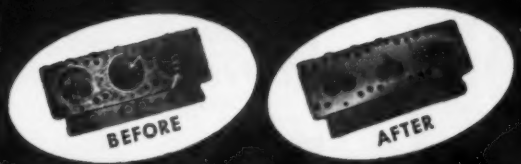


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## Dump Body

A 2-in-1 utility dump body designed to be of use as a general utility body and a heavy-duty dump body, has been

Dump Body

introduced by Morysville Body Works, Inc.

The unit has weatherproof compartments with adjustable shelves and trays for carrying equipment and tools. When the dump body tilts the utility body remains stationary. The dump body has approximately a 3½-yd. capacity. The entire unit is available to fit ¾-ton up to 2-ton chassis.

**Morysville Body Works, Inc., Boyertown, Pa.**

For more details circle 150 on Enclosed Return Postal Card.

## "T" Footing Cutter

A new "T" footing cutter that can be mounted on any Ditch Witch trencher in the M3 and M4 series has been de-

"T' Footing Cutter

veloped by the Charles Machine Works, Inc.

This attachment can dig a foundation footing with 8-in. stem and 16-in. "T" footing. For heavier jobs, a 12-in. stem, 24-in. "T" footing cutter which mounts on the Ditch Witch K2, 4-wheel drive trencher is available.

**Charles Machine Works, Inc., Perry, Okla.**

For more details circle 151 on Enclosed Return Postal Card.

## New Derrick

Now available from the Utility Body Co. is the Model DO Derrick designed to mount on top of enclosed line bodies, structurally supported open bed bodies, or flat platforms.

The derrick is mounted near the center line of the rear axle. It operates to the rear as well as both sides of the truck. The chassis can be moved with the derrick under-load with a pole or other heavy object due to the center line location of the derrick. Both the 37 and 40-ft. models have a 10-ft. line boom extension. The upper boom is extended by a double acting hydraulic

Utility's Boom Derrick

cylinder. Both booms are guided by phenolic slides and four way ball bearing supported rollers. The hydraulic digger attaches to the upper end of either boom. Pilot check safety valves are provided to hold fluid in case of line failure.

**Utility Body Co., 1530 Wood St., Oakland 7, Calif.**

For more details circle 152 on Enclosed Return Postal Card.

## Back-Up Horn And Flasher

An automatic back-up warning horn, the Dynalert, designed for rolling and track-type vehicles, has been announced by Atkinson Dynamics.

Both audio and visual warnings can be had by the addition of a red flasher, offered as an accessory. The transistor circuitry is sealed in epoxy plastic for protection against weather and vibra-

Dynalert Warning Device

tion. The horn and flasher is housed in a cast aluminum casing. They operate on either 6, 12, or 24 volts.

**Atkinson Dynamics, 10 W. Orange Ave., South San Francisco, Calif.**

For more details circle 153 on Enclosed Return Postal Card.

## Cat Attachments

An angling blade attachment for Cat 977H track-type loaders, and a push plate for all Cat wheel loaders has been

Angling Blade

announced by Balderson, Inc.

The angling blade may be angled in either direction at 25-deg. Its end bits and cutting edge are replaceable. It has automatic built-in tilt and has no outside push arms. The second attachment is a push plate--counterweight combination. It is designed for use as pushers for small scrapers, bumpers or any equipment that needs a push.

**Balderson, Inc., Wamego, Kan.**

For more details circle 154 on Enclosed Return Postal Card.

## Rear Tractor Tire

A new rear tractor tire with wider cleats, called the Power Industrial Rear Tractor Tire, is being produced by B.

Rear Tractor Tire

F. Goodrich.

According to the manufacturer the tire is especially suitable for tractors equipped with backhoes, trenchers and lift loaders. The wider cleats on the tire are designed to give better wear and traction on hard surfaces. The product is constructed with tube-type Tyrex cord, and comes in a variety of sizes.

**B. F. Goodrich Co., Akron, Ohio**

For more details circle 155 on Enclosed Return Postal Card.

## Portable Crushing Plant

A portable crushing plant named Uni-Twin has been developed by Lippman EngineeringWorks, Inc.

The plant is 39-ft. long, 12-ft. high and 8-ft. wide. Material is moved from the feed end to discharge point continuously over screen sections. As a

**The Uni-Twin Crushing Plant**

result, all finished material, including fines, are discharged without rehandling. All major components can be reached without dismantling feed or conveying equipment. The model presently in operation uses one 12 x 36-in. Jaw Crusher, one 42 x 24-in. Roll Crusher, one 3 x 8-ft. two-deck scalping screen, and two 4 x 10 ft. double-deck vibrating screens, a rotary lift, and 36-in. x 15-ft. discharge conveyor and one 30-in. x 11-ft. return conveyor. Both jaw and roll crusher are independently powered.

**Lippmann Engineering Works, Inc., 4603 W. Mitchell St., Milwaukee, Wisc.**

For more details circle 156 on Enclosed Return Postal Card.

## Worker Platform

A new catwalk platform, designed as an attachment for their fully-hydraulic, truck-mounted crane, has been announced by Teale and Co.

The platform attaches directly on the 16-ft. boom providing workmen with a 4-ft. wide and 12-ft. long working area. The 12-ft. length folds down to a 8-ft. width by swinging the hinged end-sections back. With On-Platform controls, workmen are able to raise themselves to any desired height, up to 25-ft., and lower themselves all the way to the ground. The platform swings in a full 360-deg. circle, and can be revolved by means of a center-mounted crank. The unit has a capacity of 1000-lbs. with crane outriggers to stabilize the platform.

**The Teale Catwalk**

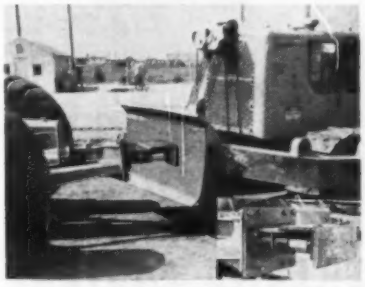
**Teale and Company, P. O. 605, Downtown Station, Omaha 1, Nebr.**

For more details circle 157 on Enclosed Return Postal Card.

## Shock Absorber

A new scraper-mounted shock absorbing device, the Hydra-Bumper, designed for scraper-tractor push loading, has been announced by the Hydra-Bumper Co.

To be mounted on the scraper push block, the cushioning unit employs two independently acting hydraulic cylinders in absorbing contact with the tractor in loading gear. Cylinder arrangement permits tractor to pick up



**Hydra-Bumper Absorber**

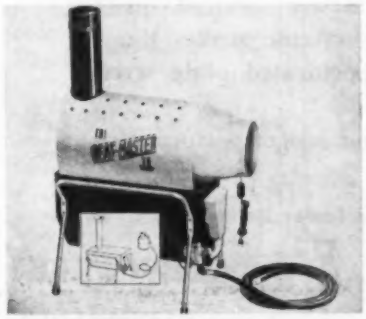
scraper at any angle up to 30-deg. off center and still make full contact between scraper and tractor push plate. Scrapers may be push loaded with a dozer blade. The maker states that regardless of equipment used for push loading, the scraper is always fully protected from shock and jolts.

**Hydra-Bumper Co., P. O. Box 775, McPherson, Kan.**

For more details circle 158 on Enclosed Return Postal Card.

## Gas-Fired Portable Heater

A 65,000 btu/per hr. gas-fired portable heater designed principally for spot heating outdoors, circulated heat



**The Heat Master Portable Heater**

indoors, and drying and thawing of construction materials has been announced by ThermoDynamics, Inc.

The unit, known as the Heat Master, operates on natural or LP-gases and is available with three different gas controls: manual, with pilot, and fully automatic with pilot. A limit switch in the forced-air blower automatically turns it off in the event of a flameout. The heater weighs 54 lb. with the hood, 35 lb. without. It can be converted into a space heater by removal of the directional hood and blower.

**ThermoDynamics, Inc., Englewood, Colorado**

For more details circle 159 on Enclosed Return Postal Card.

## Hydraulic Pump

A 2-stage hydraulic pumping unit, the Vanguard VI - Y-60 Series, designed to increase the flow of oil during the high-pressure stage, has been announced by Owatonna Tool Co.

The unit operates at pressures up to 6,000 psi. The pistons of the 5-cylinder axial piston pump, which operates during the high pressure stage, have been enlarged over previous models to increase the pumping speed for high-pressure requirements. The low-pressure stage consists of a high volume gear pump which moves the hydraulic ram to and from the work. When equipped

**Vanguard VI Pump**

with a 3450 rpm jet pump type motor it delivers the following volume of oil at various pressures: 600 cu. in./min. at 100 psi; 400 cu. in./min. at 500 psi; 135 cu. in./min. at 1000 psi; 110 cu. in./min. at 6000 psi.

**Precision Hydraulics Div., Owatonna Tool Co., 435 Cedar St., Owatonna, Minn.**

For more details circle 160 on Enclosed Return Postal Card.

## Optional Stabilizer

An optional stabilizer for close quarter work is now available for use on the Dynahoe, a completely integrated loader-tractor-backhoe, from the Hy-Dynamic Co.

The new stabilizers operate vertically, providing vehicle support during the backhoe operation without requiring any side room beyond the width of the tractor itself. When equipped with the new stabilizers the Dynahoe can be positioned alongside any building, curb or similar impediment.

**Hy-Dynamic Co., c/o R. Wiggers, 221 N. LaSalle St., Chicago 1, Ill.**

For more details circle 161 on Enclosed Return Postal Card.

The Optional Stabilizer

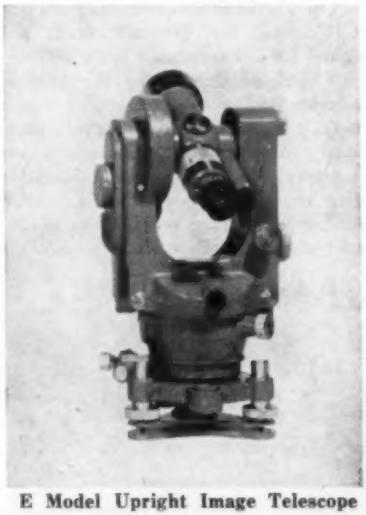
## Erect Image Telescope

Engineers and surveyors who prefer working with an upright image can do so with the E Model T-1A Optical Repeating Transit telescope produced by Wild Heerbrugg Instruments, Inc.

The micrometer reading on this telescope is 20-sec. direct. The vertical circle is self-indexing. The instrument has upper and lower azimuth motion for setting on zero and repeating. It comes in a green color that has been tested and found acceptable as a high heat-reflecting, low light-reflecting color.

**Wild Heerbrugg, Instruments, Inc., Main & Covert Streets, Port Washington, L. I., New York**

For more details circle 162 on Enclosed Return Postal Card.



E Model Upright Image Telescope

## Auxiliary Governor

An auxiliary governor system to control the speed of power equipment with a wide variation in load requirements has been developed by the Holley Carburetor Co.

The governor can be adapted to control the speed of any hydraulic or mechanical devices powered by gasoline engines. The system operates from a driven unit mounted on the power take-off and automatically adjusts the throttle to maintain specified speed of the work tool with every change in load. It has been designed to operate in conjunction with the engine speed governor as calibrated by the engine manufacturer.

Holley's Auxiliary Governor

**Holley Carburetor Co., 11955 E. Nine Mile Road, Warren, Mich.**

For more details circle 163 on Enclosed Return Postal Card.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The City of Bloomington, Minnesota (population 54,000) is accepting applications for the position of Director of Public Works—City Engineer. Applicants must be registered Civil Engineers with at least five years' experience in Public Works and Engineering. Starting salary $9,000 to $12,500 depending on experience. Send resume to:

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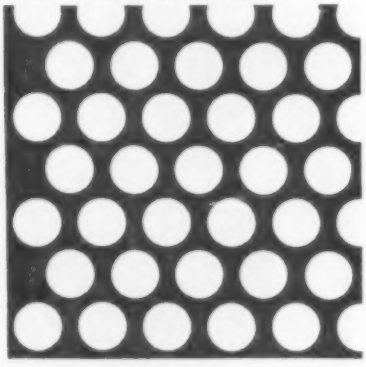

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Model 206H-4A, Serial No. E8246, 30" x 60' w/single deck buzzer and hopper, engine—Minneapolis Moline Model 206H-4A, Butane equipped, mounted w/rubber tires and hitch for towing, Hyd. cradle for raising. EXCELLENT CONDITION. **$7,500.00**

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1—Euclid S-12 Demonstrator.

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| Solid Smooth | 22 x 10 x 16 - | Lots of 10 - $28.00 ea. Less - $35.00 ea. |
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All Well Known Makes - Monarch, Goodrich, etc.

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2½ yd. OSGOOD (Marion) 1007 Dragline, was new 7/31/49, 80' boom, Buda Diesel. 2½ yd. bucket. Good Condition. — f.o.b. Leola, Pa.

2½ yd. OSGOOD (Marion) 1007 Dragline, was new 9/30/48, 80' boom, D100000 Cat. Diesel 2½ yd. bucket. Very Good Condition f.o.b. Leola, Pa.

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¾ yd. GENERAL Shovel, Diesel Engine, operating. f.o.b. Leola, Pa.

2 yd. shovel front with bucket, good condition, fits any of the three 2½ yd. Osgoods previously listed. f.o.b. Leola, Pa.

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¾ NORTHWEST Shovel, ¾ yd. bucket, Buda gas engine, 1954. Good Condition. f.o.b. Leola, Pa.

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## WEMCO 24" CLASSIFIER

Fine Material - Classifier in very good condition. Complete with Gear Reducer and Power $2,200.00.

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¾" DIA. 4500 FT. PER REEL
1 REEL .....10 PER FT.
10 REELS .....085 PER FT.

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1—Gallon Model 102 Patrol
1—D-7 Cat Tractor, Serial 3T 26350
1—#70 Cat Scraper, Serial 3W5535
1—#12 Cat Patrol, Serial 7T 919
1—Ford Truck T 950 Tandem 1958 Model
1—D-8 Cat Tractor, Serial 2U 10768
1—255A P&H Dragline, Serial 8201
1—16S C.M.C. Mixer, Serial 125666
1—Backhoe attachment for ¾ Yd. Northwest
1—99M Austin-Western Patrol, Serial 4486
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1—255A P&H Dragline, Serial 8145
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150 ton Noble Batching plant (wet or dry) complete in all respects. 400 barrel silo. 150 ton/hr. agg. elevator. Price $20,000. ALADDIN ROCK CORP., 1074 S. Arroyo Parkway, Pasadena, California. ATlantic 1-4786

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2—5 YARD WORTHINGTON CONCRETE MIXERS.
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1—ROSS LIFT TRUCK—7 Ton Capacity.
1—CLARK LIFT TRUCK—2 Ton Capacity.
1—6" FULLER KINYON CEMENT PUMP—Including electrical equipment, slides, compressors, etc.—Excellent Condition.
1—MODEL 25 NORTHWEST CRANE AND DRAGLINE.
1—BACKHOE ATTACHMENT—For Northwest 25.
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3500' 6" GENERAL ROAD PAVING FORMS.
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Two LIMA Truck Cranes, Type 44T, 30 Ton, recent models, excellent condition.

One BUCYRUS-ERIE 51-B diesel Shovel.

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Group of Seven EUCLID 8TD Rear Dump Units with 56BY Bodies, 16 Cubic Yards.

REX Pumpcrete Machine Model 160-S, with assortment of 6" pipe and miscellaneous fittings.

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THIS UNIT HAS NEVER BEEN USED (NOT GOV'T SURPLUS)

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Seaman Self-Propelled Pulvi-Mixer with Pumping equipment, Diesel Power. Must be late model, good condition.

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2—Barber-Greene Finishers 879A $6,000.00 each
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1—Bucyrus-Erie Crane, Model 22-B $8,000.00
1—Backhoe for 22B $1,900.00
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1—Cat. 955 Front End Loader $6,000.00
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2—1958 Ford F-500 Dumps $1,250.00 each
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Cast Iron Water Fittings, new, one-half price.
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10—Model DW20 Caterpillar Pneumatic Tired Tractors with modified cat. 456 Scrapers. These are 67C series serials.

Old Price ..... $27,000.00 Ea.
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Above prices are F.O.B. Redding, California

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1 Koehring 304, ¾ yd. shovel front, like new
1 Bucyrus-Erie 16B shovel front, good condition
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| 1 | OH 40 | (4' overhead) Entz | $10,000 |
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| 1 | P-40 | (4' portable) Entz | 8,500 |

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| 1 | 4' Vesper (narrow knives) Equalizer, no power | 2,999 |
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| 1 | 4' Vesper w/Entz Equalizer - Electric power | 2,999 |

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5 Yard 80 ft. Dragline and 4 Yard Standard Shovel — Buda 1290 Diesel with Torque converter.

Very Good Condition

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CEDARAPIDS 3042 DOUBLE IMPACTOR Portable Plant #14066 w/feeder, Murphy diesel, tandem axles, pneumatic tires. Capacity 250 tph plus. Very good. $21,000.

PIONEER 2436 JAW PORTABLE Primary w/ feeder, conveyor, tandem rubber. Good. $16,250.

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CEDARAPIDS 4033 HAMMERMILL PORTABLE w/4x12 screen, rotovator, 290 hp. Cummins diesel, plant & two delivery conveyors, tandem rubber. $18,000.

UNIVERSAL 2930 PORTABLE PLANT w/1824 Jaw, twin dual rolls 16x24 & 14x24, rotovator, plant & delivery conveyors, Cat. D1,000 diesel, tandem rubber, late mdl., rebuilt. $22,000.

UNIVERSAL 3042 JAW CRUSHER w/4x18 apron feeder, 5x10 Pioneer Mosabi grizzly, 36" x 90' conveyor, all electric powered. $16,500.

PORTABLE SURGE BINS, 10 cy. w/4 cyl. engine, pneu. tires, excellent. $2500. Cedarapids 6 cy. w/electric motor, pneu. tires, 30" conveyor, excellent. $2250. Shopmade 6 cy, good. $1250.

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BAY CITY 20 TON MOTORCRANE, used 1400 hrs, excellent. $800/mo. apply purchase $17,500.

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INGERSOL RAND 600 cfm Rotary Compressor w/671 GM diesel. $5500.

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**BROWNING TRUCK CRANE**
**S/N 4300**
**60' BOOM & JIB**

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**ILLINOIS CONTRACTORS' MACHINERY**

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9 ea. Shovelfronts, Link-Belt HC70, ¾ cu. yd. unused ..... $750.00 ea.

All prices F.O.B. Compton, Calif.

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20 Ton P&H Truck Crane - 255 AC 100′ boom - 20′ jib. Extra counterweight, used for steel erection and machinery moving, excellent clammer. Factory New overhaul, new tires, excellent. Sacrifice .....$12,000

25 Ton Linkbelt Truck Crane - 90C 100′ boom - 20′ jib. Used for steel erection & machinery moving. Factory. Good tires. Excellent condition .....$16,000

10 to 12 ton Huber Roller - Diesel engine (newly o'hauled) power steering - Excellent condition .....$4,000

D8 Bulldozer Model 1-H, complete motor overhaul, running gear all rebuilt like new - cable blade - Hyster towing winch. Excellent .....$5,500

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5 ea. Generator Sets, Buda Diesel, 50 KW, DC, with electrical & mechanical spare parts, unused .....$1750.00 ea.
6 ea. Generator Sets, Gasoline, 30 KW, AC, Excellent condition .....$850.00 ea.

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Link-Belt ½ Yd. Model LS50, Serial No. 5D901 BACKHOE, with GM 2-71 Diesel Engine .....$ 4,000
BYERS SHOVEL, ⅜ Yd. with LeRoi gas engine, Model JR8052 ..... 1,500
Koehring ¾ yd. Model 305 SHOVEL AND BACKHOE, with Int. Diesel engine, Serial No. 5346 ..... 13,000
Northwest Model 25 PULLSHOVEL with Murphy Diesel engine, Serial No. 18265. 19,000
Ottawa BACKHOE mtd. on Harris Tractor Serial No. 20468 ..... 3,000
Ottawa BACKHOE mtd. on Minneapolis-Moline Tractor with Dozer blade, Serial No. DXUTIHW 771 ..... 3,400
Ottawa MARAUDER with FRONT END LOADER AND BACKHOE, Serial No. SS6253 (1960 Demonstrator) ..... 10,500
Ottawa Hydra HAMMER, Model SPHH1000, Serial No. 1328M8 ..... 4,500
Cleveland Model 95 TRENCHER (Pitcher) ..... 2,000
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1957 Gradall. Excellent condition. Price ..... $17,500
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Eagle Portable CRUSHING PLANT w16x24 Jaw Crusher, 30" Telesmith secondary crusher, 3½ deck screens, closed circuit plant, electric power needed. Will produce 3 sizes washed, crushed material plus sand ..... 63,000
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plus frt. Sell ..... 14,000
Ingersoll - Rand Model FM-4 WAGON DRILLS, w/X-71 Drifters (2) ..... 2,000 ea.
Hough Model HUD LOADER/BACKHOE (Diesel) ..... 8,000
Adams GRADER ..... 3,500
COMPRESSORS:
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I-R 105 cu. ft. ..... 1,100
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# Manufacturers' Literature

RIPPER TIPS, TEETH AND SHANKS: A detailed folder describing the new tips, teeth and shanks on Caterpillar Rippers, and featuring the new weld-on adapter for the No. 9 and No. 8 Rippers which allow the use of new tips with all types of shanks, has been released by Caterpillar Tractor Co., Peoria, Ill.

Another feature concerns the ability of the self-sharpening tips to fit both rippers as well as the teeth used on buckets for digging. Information to machine users regarding cutting edges is also included. Details can be acquired anent reversible router bits for scrapers, and self-sharpening end bits to protect dozer end plates.

For more details circle 164 on Enclosed Return Postal Card.

MAINTENANCE OIL DISTRIBUTOR: A 4-pg. bulletin, No. 566-B, describing the Model RHU road oil distributor in 800 and 1000 gal. capacities with a choice of three styles of spray bars has been made available by Rosco Manufacturing Co., 3118 Snelling Ave., Minneapolis, Minnesota.

For more details circle 165 on Enclosed Return Postal Card.

BRIDGE DESIGN: The recent Steel Highway Bridge Design competition held under the auspices of the American Institute of Steel Construction, Inc., has produced many new concepts in bridge design. A booklet containing 36 of the 300 designs submitted to this competition is now available from the American Bridge Division of U.S. Steel, 525 William Penn Pl., Pittsburgh 30, Pa.

Requirements of the competition were that a two-lane crossroad steel bridge to span a modern four-lane highway was to be created. All designs generally placed emphasis on ease of fabrication and erection, economy in the use of structural steels for weight reduction, and the integration of different types of steel into a single design. The designs included were chosen on the basis of the individual design ideas they contained. In general, the publisher states, the many uses of new kinds of steel were explored to advantage. With the increasing importance of an extensive bridge system in this country, the results of the competition can be of great value to planners.

For more details circle 166 on Enclosed Return Postal Card.

SOIL-CEMENT MIXTURE FILM: "Standard Laboratory Control of Soil-Cement Mixtures," a new sound and color 16 mm. motion picture of the Portland Cement Association, 33 W. Grand Ave., Chicago 10, Ill., is now available.

The new film describes current ASTM-AASHO laboratory test methods that determine the quantities of cement and field control factors necessary for building soil-cement pavements. Latest short-cut test methods for sandy soils are included.

For more details circle 167 on Enclosed Return Postal Card.

VIBRATORY MATERIALS: A new condensed catalog of vibratory materials handling equipment, vibrating parts handling equipment, mechanical shaft seals, paper joggers, portable power tools and power rectification equipment has been published by Syntron Co., 507 Lexington Ave., Homer City, Pa.

The catalog, No. 616, contains over 200 illustrations and presents descriptions, data and specifications on all the manufacturer's products.

For more details circle 168 on Enclosed Return Postal Card.

## WHAT ABOUT YOU MR. READER?

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## With the Manufacturers

PART OF KOPPERS RESEARCH PROJECT: Pictured here is the first completed buildings of a Research Center for Koppers' Company scientists in Monroeville, Pa. This building represents an investment of 8½ million dollars, and will accomodate 450 scientists and their assistants. The completed center will house over 1,500 scientists whose task it will be to develop new and improved products in the company's chemicals and plastics industry, along with the company's traditional work in steel, coal by-products, wood preserving, fabricated metal products and merchant coke plants.

AMERICAN-MARIETTA: It has been announced that the Board of Directors of American-Marietta and the Martin Co. have reached an understanding with respect to a proposed consolidation of the two companies. George M. Bunker will be Chairman of the Board and President, Grover M. Hermann will be Vice Chairman of the new company. Each said in a joint statement: "It is anticipated that the new company will be in a position to serve better its government and military customers as well as those in areas essential to the construction industry and the general civilian economy.

U.S. STEEL: The American Bridge Division of U.S. Steel has been awarded the contract for the steel superstructure for the new Covington, Kentucky to Cincinnati, Ohio bridge over the Ohio River. The bridge, a through cantilever double-deck type structure will be 1,736-ft. in length and is scheduled for completion by June, 1963. Pier foundations on both sides of the river, as well as two river piers, are under construction.

In the construction of the bridge some 4,700 cu. yd. of concrete, 500 tons of reinforcing steel, and 8,700 tons of structural steel will be used. It will have two 42-ft. roadways, one for each direction across the river.

SHATTUCK DENN MINING CORP.: Willard J. LaMorte has been elected president of Shattuck Denn Mining. He succeeds Thomas Bardon, who will continue as chairman.

Mr. LaMorte was formerly president of Richmond Screw Anchor Co., a subsidiary of Shattuck Denn, and was involved in the manufacture of formtys, anchors, inserts, accessories and supports for the concrete construction industry. Shattuck Denn mines zinc, lead, copper, silver and gold and produces uranium and fluorspar.

WESTINGHOUSE AIR BRAKE, LEROI DIVISION: The Westinghouse Air Brake Co. announced that its Le Roi Division operations in Cleveland will move to Sidney, Ohio, where they will be consolidated into the Division's Sidney plant. Improved operating efficiencies are expected to result from this consolidation.

WORTHINGTON CORP.: Eugene P. Hagan, Vice President and Comptroller, Worthington Corp., Harrison, New Jersey, died July 25th in St. Barnabas Hospital, Newark, after a brief illness. He was 53 years old.


**MARYLAND—Starting position as an Engineering Chemist with State Roads Commission. Requires degree in chemistry OR two years of college with courses in chemistry and three years experience involving chemical and physical analysis of highway construction materials. Salary: $5040-6302 (maximum in six years.) Write: Professional Recruitment, Commissioner of Personnel, 301 West Preston Street, Baltimore 1, Maryland.**

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**Special report to users of Caterpillar D7, D8 and D9 Tractors:**

CAT CATERPILLAR

Parts you can trust
...cost less per hour

# New Piston and Ring Combination Cuts Oil Consumption 33-50% ...Lasts Hundreds of Hours Longer!

What makes it so different? Look at the two Caterpillar-made pistons. Notice in the new design that *both* compression rings are now deeply seated in grooved cast iron (indicated in yellow) instead of only the top ring. Since cast iron is able to resist groove "pound out," both compression rings are held firmly *longer* in the correct position for maximum ring-to-liner sealing. Compression loss and blow-by *behind* rings and around grooves is delayed hundreds of hours, too.

The new intermediate compression ring is a "twist" ring, so-called because it changes position in the groove during the power stroke. It actually "twists" so its face has *greater sealing area* at the liner than regular rings—reducing the number of compression rings normally required. At the same time, it thins the film of oil left by the regular oil control ring. This leaves less oil to burn away which contributes to the new piston's better oil control and longer ring life.

All rings now have a new look, too . . . *each and every* face is thickly chrome plated against wear. They are also "bright lapped" to such brilliance that any flaws can be easily seen and the faulty ring rejected. Such quality control assures almost perfect seating right from the start, eliminating break-in blow-by, slobbering and scuffing.

Cost? Pistons with the *extra* cast iron bands cost *slightly more*, but ring sets are less! Once you change over, your tractor maintains its power longer, your fuel and oil bills go down, and your next set of replacement rings will be less. Your Caterpillar Dealer has them in stock now.

Caterpillar Tractor Co., General Offices, Peoria, Ill., U.S.A.

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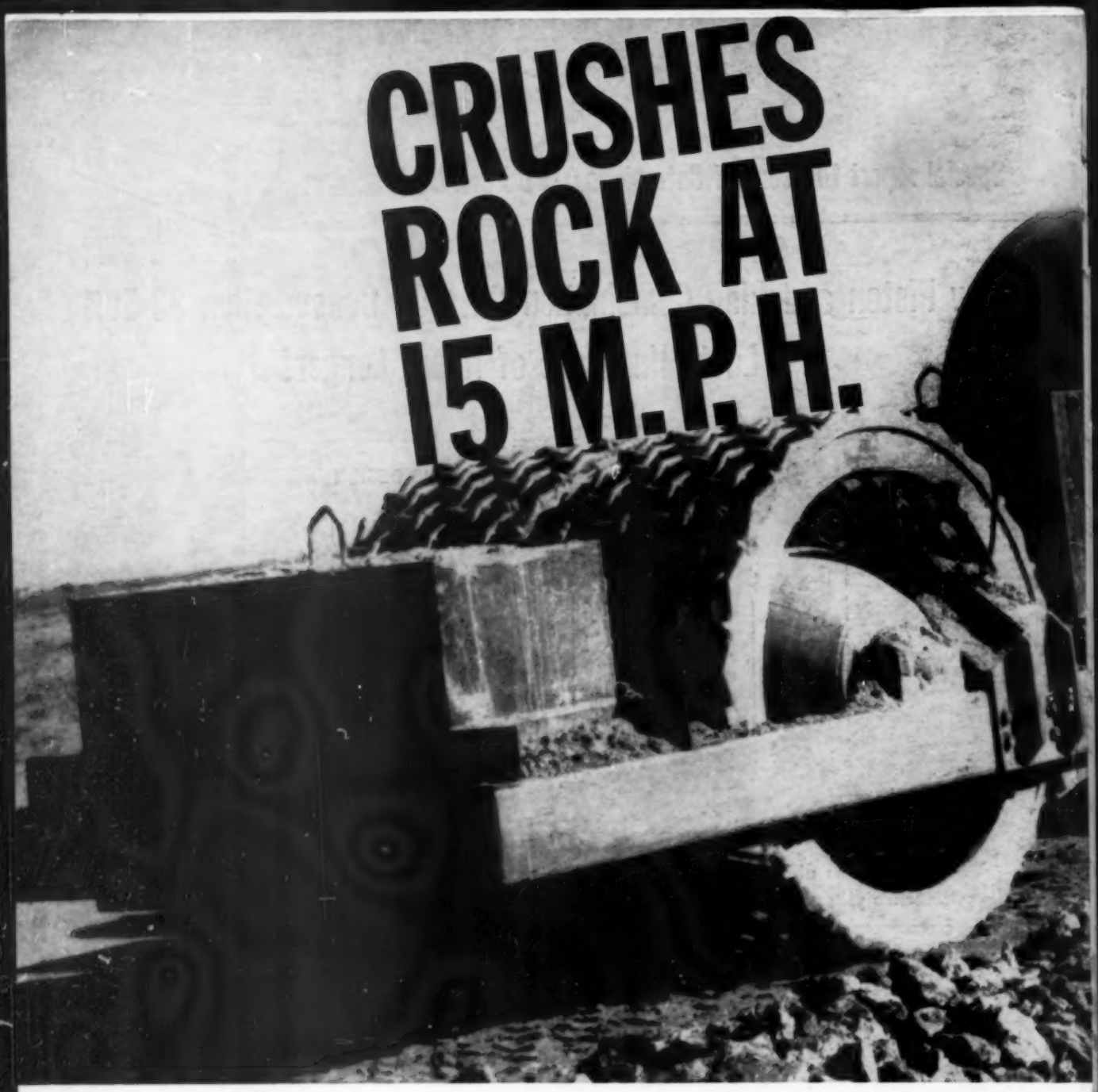

Ever see one of these Hyster "Grid"* rollers rolling and crushing rock? It whams into the soil at a high speed for rollers. The wheel bearings have to take terrific shock loads. And they do—they're Timken® tapered roller bearings. Hyster Company engineers specified them because Timken bearings are tapered to take any combination of radial and thrust loads. The large contact area between rollers and races gives extra load-carrying capacity.

Maintenance? Hyster Company says these Timken bearings require no additional lubrication after the initial supply. They hold shafts concentric with housings, make sealing more effective. Lubricant stays in, dirt out. In fact, the Timken bearings in this roller have performed for over 5 years without trouble or replacements.

Call us . . . call for a Timken bearing graduate sales engineer when you're designing bearing applications. Our engineers can often solve your bearing problems on the spot. For the most for your money, specify "Timken". The Timken Roller Bearing Company, Canton 6, Ohio.

Industry rolls on

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*"Grid" is registered trade-mark for Hyster open-surfaced roller.

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